Remedial Action Plan

Former Y-12 Facility
Anaheim, California

Prepared for

Northrop Grumman Systems Corporation

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El Segundo, California 90245

Equipoise Project No. CA100.Y-12.DZ

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1.0 INTRODUCTION

Equipoise Corporation (EQC) is pleased to present this Remedial Action Plan (RAP) for Northrop Grumman Systems Corporation (Northrop Grumman) to implement remediation of the unsaturated soil and semi-perched zone water impacted by chlorinated hydrocarbons at Northrop Grumman's former Y-12 Facility (Site) located at 301 Orangethorpe Avenue in Anaheim, California (Plates 1 and 2). The Regional Water Quality Control Board (RWQCB) – Santa Ana Region is the lead oversight agency for the Site, and this RAP has been prepared in accordance with RWQCB Cleanup and Abatement Order (CAO) No. R8-2003-108. This document is intended to provide a remedial approach that will result in the effective and efficient remediation of chlorinated hydrocarbons from soil and semi-perched zone water beneath the Site leading to issuance of a No Further Action (NFA) determination for the Site.

This RAP is based on the Groundwater Remediation Plan submitted by URS Corporation in October 2004 (URS 2004) and results of the soil vapor extraction (SVE) pilot test conducted in October 2006 (ABBLES 2007) and a pre-design investigation conducted by ARCADIS U.S., Inc. (ARCADIS) and reported by Ninyo & Moore (Ninyo & Moore 2008). The Groundwater Remediation Plan presented an analysis of potential remediation alternatives for the Site and identified an approach combining SVE and two-phase extraction as having the most likelihood of success. In order to effectively design a treatment system, pilot testing was considered necessary and a plan was presented to the RWQCB. Results of the pilot testing are presented in subsequent sections.

The RAP is organized into the following Sections:

- **Section 1.0 – Introduction**: Section 1.0 introduces the RAP, report organization, and objective.
- **Section 2.0 – Background**: Section 2.0 presents background information, a site description, and a discussion of site geology and hydrogeology,
- **Section 3.0 – Summary of Pre-Design Investigation Results**: Section 3.0 presents a summary of the pre-design investigation results including soil vapor data and SVE pilot test results.
- **Section 4.0 – Remedial Action Technical Approach**: Section 4.0 presents details of the selected remediation action.
- **Section 5.0 – Additional Components**: Section 5.0 provides details of additional components within the RAP including the horizontal well pilot test and an additional groundwater monitoring well installation.
- **Section 6.0 – Schedule**: Section 6.0 provides details of the anticipated project schedule.
- **Section 7.0 – References**: Section 7.0 provides a list of references used within the document.

1.1 OBJECTIVE

The purpose of the RAP is to implement a practical and feasible remedial technology for the removal of volatile organic compounds (VOCs) from the unsaturated soil and perched water zone in the area of highest impact at the Site. SVE has been selected as a technically appropriate remediation approach for the unsaturated zone and will be coupled with dual phase extraction (DPE - air extraction piping [stingers] assisted with air-lift) to remove semi-perched zone water in targeted areas of the Site. The scope of the SVE system includes the design and installation of 29 vertical vapor extraction wells, several horizontal vapor extraction wells (exact number dependent on the results of a horizontal well pilot test discussed later), vapor monitoring probes, piping network of more than 2000 feet, and a vapor treatment system. Select deeper SVE wells (approximately 10 wells) will be completed into the semi-perched zone and equipped with stingers to remove semi-perched water using DPE. Once the installation is completed, the system will be operated in accordance with regulatory requirements and its effectiveness will be evaluated based on performance monitoring criteria.

2.0 BACKGROUND

2.1 BACKGROUND

A detailed background of activities on the site leading up to this workplan is available in the report entitled *Pre-Design Investigation Report, Cleanup and Abatement Order No. R8-2003-108, Former Northrop Grumman Y-12 Facility, 301 E. Orangethorpe Avenue, Anaheim, California* date May 9, 2008 prepared by Ninyo & Moore (Ninyo & Moore 2008).

2.2 SITE DESCRIPTION

The Site is bordered to the north by Fullerton Creek, a concrete lined drainage channel and to the south by Orangethorpe Avenue and is approximately 9 acres. The Site is relatively flat with an elevation of approximately 160 feet above mean sea level. A trailer park and commercial/light industrial properties border the Site to the east and west, respectively.

Northrop Grumman operated at the Site from approximately 1962 to 1994. The site is currently occupied by EMPI, Inc. (EMPI), an automotive products manufacturing, packaging and shipping facility. EMPI has constructed two additional buildings north of the original Y-12 buildings occupied by Northrop Grumman (Plate 2).

2.3 SITE GEOLOGY

Previous subsurface geologic studies have shown the sediments above approximately 70 feet bgs to be predominantly comprised of poorly-graded sand interbedded with thin beds of silts, silty sand, and clayey sands. The sandy soil is followed by an interbedded transition zone of silts, clays, and fine sands that is approximately 25 feet thick and is underlain by a 15- to 30-foot thick clay horizon. The sediments below the clay interval are characterized by poorly-graded saturated sands to a depth of approximately 200 feet bgs.

2.4 SITE HYDROGEOLOGY

The Y-12 site is located within the Santa Ana Forebay Groundwater Subbasin as identified by the Orange County Water District. The uppermost regional aquifer beneath the site (the Upper aquifer) is first encountered at depths of between 110 to 130 feet bgs. The Upper aquifer averages approximately 200 feet in thickness in the Orange County Basin. Regional groundwater flow in the Upper aquifer is generally to the west-southwest having a gradient of 0.001 feet per foot. The first occurrence of groundwater beneath the Site is in poorly-graded sands at a depth of approximately 70 to 95 feet bgs in localized, small,

discontinuous, semi-perched groundwater zones found above the Upper aquifer. These semi-perched zones essentially sit on top of the thick clay horizon that exists at a depth of 80 to 110 feet bgs, which effectively impedes vertical groundwater (and contaminant) flow into underlying aquifers.

Northrop Grumman installed a number of monitoring wells and initiated a quarterly groundwater monitoring program at the Site based on requests by the RWQCB. Between 1996 and 2004, Northrop Grumman installed 18 groundwater monitoring wells at several on- and off-site locations. Seven of the 18 wells (NMW-2A, NMW-3A, NMW-5A, NMW-6, NMW-7A, NMW-9A, and NMW-10A) are completed in the semi-perched groundwater zone and the remaining eleven wells (NMW-1, NMW-2, NMW-3, NMW-4, NMW-5, NMW-7, NMW-8, NMW-9B, NMW-9C, NMW-10B, and NMW-10C) are completed within the Upper Aquifer. A multiport well (CMT-01) was added to the quarterly monitoring program beginning in September 2007.

3.0 SUMMARY OF PRE-DESIGN PILOT TESTING AND INVESTIGATION

In October 2004, URS Corporation submitted a Groundwater Remediation Plan in response to a July 14, 2004 letter from the RWQCB (URS 2004). The plan presented an analysis of potential remediation alternatives for the Site and identified an approach combining SVE and two-phase extraction (SVE/TPE) as having the most likelihood of success. In order to effectively design a treatment system, pilot testing was considered necessary and a plan was presented to the RWQCB. Results of the pilot testing are presented below.

The MIP and Soil Investigation information provided below was extracted from the *Pre-Design Investigation Report* (Ninyo & Moore, 2008).

3.1 TWO PHASE EXTRACTION (TPE) PILOT TEST RESULTS

A two-day TPE (vacuum-assisted extraction) pilot test was performed by ARCADIS BBLES (ABBLES, 2007) at the former Y-12 facility in October 2006 to evaluate the potential of the method to remove groundwater from the semi-perched zone. The TPE system was operated at different inlet vacuums within well NMW-2A on the first day of the pilot test to identify optimum operation parameters. On the second day of pilot testing, the extraction pipe was moved to the deeper screened interval of NMW-11 to focus the vacuum in the semi-perched zone. Both wells were pumped dry within one hour of operation. In two days of pilot testing, 116 gallons of groundwater was extracted at a flow rate of approximately 0.13 gallons per minute (ABBLES, 2007). ARCADIS BBLES also indicated that minimal changes were measured in nearby observation wells suggesting a limited radius of influence.

3.2 SVE PILOT TEST RESULTS

In conjunction with the TPE pilot test, ARCADIS BBLES (ABBLES, 2007) also performed an SVE pilot test at the former Y-12 facility for a period of one day in October 2006 with the system operating under various inlet vacuum and flow conditions to evaluate the operational parameters for the lithologic conditions present at the Site. SVE was found to be effective in the more permeable sandy interval above 70 feet bgs. The vapor radius of influence (ROI) of the SVE pilot system is estimated to be approximately 70 feet. Communication between the shallow unsaturated zone (30 to 70 feet bgs) and the semi-perched zone was observed following the detection of negative pressures in the deep screened intervals of the extraction wells. Inlet VOC concentrations exceeded 9,999 parts per million by volume (ppmv) at all times during the test. These findings demonstrated the effectiveness and applicability of the SVE technology at the Site, and the pilot test generated essential data to successfully develop site-specific engineering design parameters for full-scale application once the treatment area was defined.

3.3 MIP INVESTIGATION

The initial MIP investigation was conducted in September 2007 and the second phase was conducted in March 2008. A total of 17 MIP locations were sampled. The MIP probes were installed to a maximum depth of approximately 72 to 78 feet bgs.

The MIP logs indicated a generally consistent lithologic sequence in the study area. The surface soils are sandy down to approximately 4 to 5 feet bgs. A generally fine-grained unit is present from 4 to 5 feet bgs down to approximately 25 feet bgs, and consists of interbedded clays, silts and sands. A sand-rich unit with several thin clay layers extends from approximately 25 feet bgs to 55 or 60 feet bgs. Another predominantly fine-grained unit is then found below 55 to 60 feet bgs to the maximum depth sampled. The MIP logs are provided in the *Pre-Design Investigation Report* (Ninyo & Moore 2008).

The MIP results indicate the likely presence of VOCs below clay/silt layers found at several depth intervals, including a shallow zone found between approximately 8 and 25 feet bgs and a deeper zone between approximately 60 and 75 feet bgs. VOCs were also indicated below thinner clay layers at intermediate depths, including one prominent clay layer observed between approximately 36 and 40 feet bgs. Areally, the MIP investigation found elevated vadose zone VOC concentrations near NMW-11 and to the west on the adjacent Trilogy Plumbing property (MIP-08) and toward the north and northwest (MIP-05 and MIP-10). The MIP results from two locations sampled in September 2007 near the EMPI building (MIP-01 and MIP-06) also indicated the potential for the presence of VOCs extending under the building to the east.

Carbon trap vapor samples were obtained from five MIP locations – MIP-05, MIP-06, MIP-09, MIP-10, and MIP-12 and analyzed by USEPA Method TO-17. The results indicated that the VOCs identified by the MIP detectors consisted primarily of halogenated compounds, with the main constituent being TCE in these locations, though lower levels of PCE, 1,1-dichloroethene (1,1-DCE) and others were also found. The electron capture detector (ECD) and photoionization detector (PID) average responses correlated with the total VOCs identified in the carbon traps, in that MIP locations with higher ECD and PID responses correlate with higher concentrations of VOCs in the corresponding carbon trap analyses.

The MIP contractor used the earlier round of MIP data to prepare cross-sections (Appendix A) showing the lateral extent of total VOCs and lithology. These preliminary cross-sections were reviewed along with

the MIP logs to assist in selecting the depths of subsequent soil vapor samples. The bright red color indicates elevated VOCs and bluish colors indicate clay layers.

A large shallow plume is noted between approximately 8 and 25 feet bgs centered around MIP-10 and MIP-05 which straddle the property line between the former Y-12 site and Trilogy Plumbing to the west. These findings suggest that a shallow source area is likely present in the northeastern portion of the Trilogy Plumbing property. The other red masses indicate the presence of smaller VOC plumes at intermediate depths.

As indicated by the red mass near the bottom of the north-south cross-section, a VOC plume was identified at a depth of approximately 60 feet to 75 feet beneath both the former Y-12 Site and the Trilogy Plumping property that extends northward from near MIP-03 to beyond the MIP-12 location. These preliminary cross-sections and the MIP logs support the interpretation that the VOCs appear to have accumulated immediately below distinct lower permeability clay layers at intermediate depths, and above the deeper clays that separate the perched zone from the Upper aquifer.

3.4 SOIL VAPOR INVESTIGATION

Soil vapor sampling was conducted in late October and November 2007, and in late February and early March 2008. A total of 66 locations were sampled, 30 outside and 36 beneath the site buildings. The soil vapor sampling locations are indicated on Appendix A - Figure 3.

The MIP logs were used to target the depths of the soil vapor samples. For example, the soil vapor sampling depths of 15, 25, 38 and 58 feet bgs in SG-06 were based on the ECD peaks at these depths in MIP-08. The SG-06 location was placed immediately adjacent to the probe location and sampled in the indicated depths in order to confirm the MIP results and to better understand the nature and magnitude of the VOCs to assist in the design of a treatment system.

Nine of the soil vapor sampling locations were placed immediately adjacent to a MIP location to quantitatively confirm the MIP results at the depths indicated in the MIP logs: SG-03 at MIP-10, SG-04 at MIP-05, SG-06 at MIP-08, SG-07 at MIP-02, SG-08 at MIP-01, SG-10 at MIP-06, SG-28 at MIP-15, SG-30 at MIP 16, and SG-40 at MIP 17.

Soil vapor probes were installed at a minimum of two to a maximum of five discrete sampling depths at each location. In a small number of cases, there was no flow from the installed probe at a given depth, so a soil vapor sample could not be collected at that depth. This lack of flow was attributed to a low porosity and/or low permeability lithology at that depth. A total of 235 primary and 19 duplicate samples were analyzed in mobile laboratories by EPA Method 8260B.

The analytical results can be readily evaluated by reviewing Appendix A - Table 1, which summarizes the detected mobile laboratory 8260B VOC concentrations in micrograms per liter (µg/L). The detected analytes are presented in alphabetical order in Appendix A - Table 1 and the detected concentrations for each analyte are presented from highest to lowest. Appendix A - Tables 2A and 2B provide a summary of the analytical results (both detected and non-detected above reporting limits), including confirmatory TO-15 results. Appendix A - Table 2A provides the data from samples collected beneath the building and Table 2B provides data from samples collected outside.

A total of 23 different VOC analytes were detected in soil vapor at the Site (Appendix A - Table 1). Thirteen of the 70 Method 8260B analytes and 20 of the 51 Method TO-15 analytes were detected. Based on the levels of observed concentrations, the most significant detected analytes are TCE, 1,1-DCE, and PCE.

A series of contour maps was prepared by evaluating the soil vapor data within five discrete depth intervals to evaluate the areal and vertical distribution of VOC mass in soil vapor. The mapped depth intervals include 5 to 12 feet bgs, 14 to 20 feet bgs, 21 to 25 feet bgs, 38 to 40 feet bgs, and 58 to 60 feet bgs. The first series of maps (Appendix A - Figures 4 through 8) illustrate the total VOC data by summing the EPA Method 8260B VOC concentrations detected within each of these depth intervals. Compound-specific contour maps were also prepared for the concentrations of TCE (Appendix A - Figures 9 through 13), PCE (Appendix A - Figures 10 through 18), and 1,1-DCE (Appendix A - Figures 19 through 23) over the same intervals. It should be noted that for mapping purposes for the TCE, PCE, and 1,1-DCE contour maps, half the detection limit was used when the analyte was not detected, so the contour values at the "not detected" ("ND") locations should be considered estimates. Discussion of the results of the total VOCs, TCE, PCE, and 1,1-DCE contour maps is presented in the *Pre-Design Investigation Report* (Ninyo & Moore 2008) and graphically in Appendix A.

3.5 SUMMARY

The MIP and soil gas results indicated the presence of VOCs below clay/silt layers found at several depth

intervals, including a shallow zone found between approximately 8 and 25 feet bgs and a deeper zone between approximately 60 and 75 feet bgs. VOCs were also indicated below thinner clay layers at intermediate depths, including one prominent clay layer observed between approximately 36 and 40 feet bgs.

Areally, soil vapor VOC plumes at multiple depths were identified extending west and northwest of the site building, under the northern half of the building, and extending westward onto the Trilogy Plumbing property. In general, these VOC plumes correlate to the onsite areas with the highest potential for a release of VOCs, based on a review of past site activities.

4.0 REMEDIAL ACTION TECHNICAL APPROACH

4.1 TECHNICAL APPROACH

EQC has prepared a detailed design of the SVE system and DPE system to address VOC concentrations in the unsaturated zone and semi-perched groundwater, respectively, at the Site. The design drawings (Appendix B) provide construction details for the proposed extraction well locations, trenching, piping, extraction manifold, electrical power plan, and instrumentation and installation details are presented in the following sections. The remediation system will include the following components:

- SVE and DPE extraction wells,
- Vapor monitoring probes,
- Piping for collection of soil vapor and semi-perched groundwater,
- Vacuum blowers (standard and high vacuum)
- Off-gas treatment device, and
- Groundwater storage tanks.

The design basis for the treatment systems consists of the Site conditions, anticipated soil-vapor flow rate, soil vapor influent concentration, anticipated groundwater production rate, South Coast Air Quality Management District (SCAQMD) air emissions requirements, applicable building codes and regulations, site safety concerns, and operation and maintenance.

4.2 WELL INSTALLATION

4.2.1 Vertical Extraction Wells

A total of 29 triple-nested vapor extraction wells (EW-1 through EW-29) will be installed using hollow stem drilling techniques at the locations presented on Plate 3. Vapor extraction wells EW-1 through EW-18 are located outside of the existing building and vapor extraction wells EW-19 through EW-29 are located within the building. Vapor extraction wells EW-1 through EW-3 were previously installed and the boring logs and well completion diagrams are presented in Appendix C. An additional deeper DPE well screened between approximately 80 and 95 feet below ground surface will be installed at SVE well clusters as noted below. The location of the vapor extraction wells, including the design ROI for each well, is illustrated on Plate 4. A summary of the proposed screen intervals for the triple-completion wells

is provided below and illustrated on Plates 5 and 6:

Wells EW-6 through EW-16 and EW-19 through EW-29

Screen Interval "A"	4 to 9 feet bgs
Screen Interval "B"	13 to 18 feet bgs
Screen Interval "C"	25 to 60 feet bgs

Wells EW-4, EW-5, EW-17, and EW-18

Screen Interval "A"	4 to 14 feet bgs
Screen Interval "B"	25 to 60 feet bgs
Screen Interval "C"	65 to 95 feet bgs (capable of DPE operations)

Wells EW-1, EW-2, and EW-3

Screen Interval "D"	80 to 95 feet bgs (capable of DPE operations)

Vapor extraction wells will be constructed with 2-inch Schedule 40 polyvinyl chloride (PVC) casings and screens with 0.010-inch or 0.020-inch slots, depending on lithology. Filter pack sands will be #3 or #2/12 sands extending to approximately 2 feet above the screened interval. A bentonite seal will be emplaced above the sand, and Portland cement grout with up to 5-percent bentonite will be emplaced to the surface. Wells installed outside the building will be completed at the surface with flush-mounted, traffic-rated boxes approximately 18-inches in diameter. Wells installed inside the building will be connected by horizontal transmission piping to valve boxes located outside the building, and no surface completion will be required inside the building.

During well installation activities, soil samples at five foot-intervals will be screened with a portable PID and the soil characteristics will be described and compared to the expected lithology to ensure proper well installation. Boring logs will be prepared for each well to summarize the subsurface conditions encountered and to detail well installations.

Soil cuttings and decontamination fluids will be placed in labeled roll-off bins or 55-gallon Department of Transportation-approved drums, profiled, and disposed of by Northrop Grumman at an off-site facility.

4.2.2 Vapor Monitoring Probes

A total of 10 vapor monitoring probes (VMW-1 through VMW-10) will be installed using direct-push

techniques at locations outside the building as illustrated in Figure 3. These wells will be utilized in evaluating the performance of the entire SVE system but from locations outside the building. Three vapor monitoring probes have been previously installed (VMW-1 through VMW-3) and the boring logs and monitoring probe completion diagrams for those wells are presented in Appendix C.

Each vapor monitoring probe will consist of three 1-inch diameter PVC casings, each with 5-foot screened interval starting at 12, 42, and 67 feet bgs. The proposed monitoring probes will be completed at the surface with flush-mounted, traffic-rated boxes, approximately 12 inches in size. A proposed triple-completed vapor probe construction diagram is illustrated on Plate 7.

Following probe installation, baseline sampling will be conducted at the three intervals within each vapor monitoring probe. Using a vacuum pump, vapor samples will be collected in Tedlar bags to be analyzed for VOCs by EPA Test Method 8260B.

4.2.3 Horizontal Extraction Wells

Approximately 11 horizontal vapor extraction wells (HW-1 through HW-11) will be installed using horizontal drilling techniques at locations close to those presented on Plate 3. The actual locations and spacing of the proposed horizontal wells will adjusted based on the results of the horizontal well vapor extraction pilot test discussed in Section 5. The objective of the horizontal wells is to provide extraction in areas in the upper 20 feet of the soil column where the formation is tighter and the ROI from vertical wells likely is not sufficient to provide full coverage. The target zones for the horizontal wells are approximately 7 feet bgs and 15 feet bgs and screen intervals will be between 25 and 50 feet long.

It is anticipated that the horizontal vapor extraction wells will be constructed with 2-inch Schedule 40 polyvinyl chloride (PVC) casings and screens with 0.010-inch or 0.020-inch slots, depending on which target depth interval the well is completed within. Wells will be connected to valve boxes outside the building and piped into the treatment unit. Soil cuttings and decontamination fluids will be placed in labeled roll-off bins or 55-gallon Department of Transportation-approved drums, profiled, and disposed of by Northrop Grumman at an off-site facility.

4.3 REMEDIATION SYSTEM INSTALLATION

The remediation system that will be installed at the Site will include the following components (details

shown in Appendix B):

- A network of trenches, over 2000 feet long, 1 to 2 feet wide, and 2 feet deep, will be excavated in the driveway area on the east, west, and south sides of the building to contain 4-inch PVC collection piping. The proposed extraction wells at the Site are divided into three operational units (Western, Eastern, and Southern) which will each consist of 12 to 15 extraction well locations.
- The proposed treatment system will initially consist of two rental units with the capacity of 500 standard cubic feet per minute (scfm) and capable of generating approximately 10 inches of mercury of vacuum at the inlet. Each of these blowers will have a Various Locations SCAQMD operating permit. These units will be used until extraction blowers with site-specific SCAQMD permits can be acquired. The blowers will be equipped with an air/water separator to remove moisture from the extracted vapors and a noise reduction feature. Each blower will have two 2000-pound, vapor-phase granular activated carbon (GAC) adsorbers for vapor stream treatment.
- DPE (Wells EW-1 through EW-5, EW-17, EW-18, NMW-11, NMW-12 and NMW-13) will have a 0.5-inch extraction line (commonly called a stinger) to remove groundwater. The DPE wells will operate as an SVE well to target soil vapor and as a DPE well to target semi-perched groundwater. The DPE system will require a separate blower, double-contained water storage tank, and appropriate system control instrumentation.
- A PVC manifold will be constructed within a treatment compound located on the western portion of the property to connect the extraction wells to the vapor treatment and water collection system. The manifold will be equipped with fittings, valves, and sampling ports to control vapor extraction source and flow rate and to collect vapor samples.
- A temporary electrical distribution station, equipped with a 480-volt 3-phase transformer and a 200-amp power panel suitable for remediation system needs, will be installed at the Site.
- The treatment compound will be fenced, locked, and emergency contact information will be posted on the fence.

4.4 OPERATION & MAINTENANCE AND PERFORMANCE MONITORING

During startup of the remedial system, operation will include vapor monitoring in accordance with SCAQMD permit requirements, system checks, and components maintenance as per vendor specifications.

The wells will be piped into three separate networks where any two networks can be operating at the same time while the third network is in a rebound cycle. The SVE well networks are identified as the Western, Eastern, and Southern operational units. Additionally, each of the vapor extraction wells in each operational unit will have multiple well completions. The shallow wells will be operated first, progressing to the deeper wells based on weekly operation visits and performance monitoring results. The DPE wells will be an independent operational unit and operated separately from the SVE operational units and will be connected to a temporary double-contained water storage tank.

During weekly operation and maintenance (O&M) visits, a technician will (1) record well and treatment compound operational parameters, including wellhead flow and pressure, (2) clean or replace filters and traps, (3) check gauge agreement through the system, (4) track the volume of water in the temporary storage tank, and (5) ensure that all components are in good working condition. Components that need repair or replacement will be noted and receive timely attention. The technician also will measure influent and effluent concentrations with a flame ionization detector, record concentrations, temperatures, pressures, flow rates and pertinent observations, and make adjustments to the system, as required.

Soil vapor sampling will be conducted in accordance with the procedures and methodologies documented in the combined Department of Toxic Substances (DTSC) and Regional Water Quality Control Board – Los Angeles Region (LARWQCB) "*Advisory – Active Soil Gas Investigations*" (DTSC and LARWQCB, January 28, 2003; hereafter referred to as the Soil Gas Advisory). The soil vapor samples will be collected at all the vapor monitoring probes and select vapor extraction wells and will be analyzed for VOCs using EPA Test Method 8260B. Soil vapor sampling will be conducted in four phases:

- Baseline Sampling – Used to evaluate the initial VOC concentrations in soil vapor before start-up of the SVE/DPE systems.

- Intermediate Sampling – used to evaluate the effectiveness of the ongoing SVE system. Interim soil vapor surveys will be conducted approximately every 3 months after system start-up. The interim surveys will be conducted as static surveys (no active vapor extraction) and will include soil vapor samples from extraction and monitoring wells.

- Final Sampling – used to evaluate the effectiveness of the SVE system after soil remediation is nearing completion (based on intermediate analytical and SVE system operating data).

- Rebound sampling – used to evaluate concentration rebound and the potential for residual VOC concentrations in subsurface soil. A rebound soil vapor survey will be conducted after a minimum of 12 weeks to assess any rebound effects or buildup of VOC concentrations in the soil gas. This rebound period will allow soil vapor concentrations to reach equilibrium with VOCs in the soil matrix.

- Groundwater sampling – results from quarterly groundwater monitoring and sampling will be used to evaluate the effectiveness of the DPE system on the semi-perched zone.

Results of system monitoring will be included in quarterly performance monitoring reports. These reports will include graphs of VOC concentration versus time for each extraction well and monitoring probe, estimates of the ROI of the extraction network, volumes of groundwater extracted and recommendations regarding whether enhancement of the SVE/DPE operation is necessary to achieve the remediation goals.

The effectiveness of the remediation system will be assessed based on three criteria: vapor radius of influence, the removal rate of VOCs, and reduction of VOC concentrations in the perched water zone. The ROI will be determined by monitoring SVE-generated vacuum in the vapor monitoring wells surrounding the vapor extraction wells. VOC mass removal rate will be calculated using both field PID readings and laboratory analytical results. The efficacy of the remedial system will also be assessed by monitoring VOC levels in the vapor extraction wells over time, prior to and during system operation.

5.0 ADDITIONAL WORKPLAN COMPONENTS

5.1 HORIZONTAL WELL VAPOR EXTRACTION PILOT TEST

Following completion of the first set of horizontal wells described in the previous section, a horizontal well vapor extraction pilot test will be performed over a consecutive 2-day period. The objectives of the pilot test will be as follows:

- Determine the radius of influence of individual horizontal vapor extraction wells,
- Estimate vapor concentrations and removal rates, and
- Establish the number and location of horizontal vapor extraction wells required to infill locations between the vertical extraction wells.

Two 75-foot long horizontal wells will be installed underneath the southern portion of the building on the Site for pilot test purposes at the location presented on Plate 3 identified as HW-1. Well HW-1A will be 75 feet long and screened from approximately 45 to 70 feet at an approximate depth of 7 feet bgs. Well HW-1B will be 75 feet long and screened from approximately 45 to 70 feet at an approximate depth of 15 feet bgs. Six temporary vertical vapor monitoring probes (TMW-1 through TMW-6) will be installed in the vicinity of the extraction test well to serve as pressure monitoring wells; the locations are presented on Plate 3. A proposed double-completed well completion diagram is illustrated on Plate 8. Temporary vapor monitoring probes TMW-1 through TMW-6 will be abandoned subsequent to the horizontal well pilot test.

An SCAQMD-permitted trailer-mounted vapor extraction test system (VETS) will be used to induce a vacuum gradient toward the extraction well. The mobile VETS will be equipped with a blower to extract vapors, liquid knockout pot, particulate filters, magnehelic vacuum/pressure gauge, and flow meter. Differential vacuum will be measured at the wellhead of the extraction and pressure monitoring wells at specified time intervals. The induced vacuum measurements at the monitoring probes will be used to determine the ROI of each vapor extraction well and to identify the design ROI. Extracted vapors will be initially and periodically monitored for VOC vapors.

Soil vapor sampling will be conducted in accordance with the procedures and methodologies documented in the Soil Gas Advisory.

5.2 ADDITIONAL GROUNDWATER MONITORING WELL CLUSTER

The results of soil vapor sampling conducted in late October and November 2007 and in February and March 2008 identified elevated soil vapor results near the former quench tank at the Site. Since there are no on-site groundwater monitoring wells immediately downgradient of the former quench tank area, an additional groundwater monitoring well cluster (NMW-14A/B) is proposed to be installed on the Site at a location indicated on Plate 3 with one well in the semi-perched zone and one well in the Upper Aquifer.

The construction of these groundwater monitoring wells will be similar to existing groundwater monitoring wells NMW-2 and NMW-2A (well logs are provided in Appendix C). The construction specifics are as follows and are illustrated on the proposed well completion diagram on Plate 9:

- The total depth of groundwater monitoring well NMW-14A will be 95 feet bgs and screened from 85 to 95 feet bgs. The total depth of groundwater monitoring well NMW-14B will be 125 feet bgs and screened from 110 to 125 feet bgs.
- Each well will be constructed of 4-inch diameter schedule 40 PVC flush-threaded casing
- Each well will be constructed of 4-inch diameter schedule 40 PVC flush-threaded screen of 0.02-inch slotted screen.
- The base of the screened sections will be sealed with a PVC flush-threaded bottom caps and the top of the casings were covered with a sealable locking well caps.
- Each well-screen interval will constructed with appropriate sand filter pack from the base of the silt trap to approximately 4 feet above the screen.
- A 5-foot-thick hydrated bentonite pellet seal will be placed above the filter packs and the remainder of the annulus was filled with a cement grout. The height of the filter packs and bentonite seals will be periodically measured during emplacement by using a weighted tape.
- 12-inch diameter traffic-rated well boxes will be set in concrete and completed in a manner to prevent accumulation of surface water on or near the well box lid

After construction, the wells will be developed by surging/flushing to dislodge and remove fine sediments from the casing, the filter pack, and in the formation nearby the borehole. Sediments and well water will be removed by bailing and submersible pumping methods. The newly installed well cluster will be surveyed for location and elevation by a State of California Registered Land Surveyor.

6.0 SCHEDULE

Major steps to install the SVE system at the Site are provided below. The overall timing of the various steps is illustrated on the Project Schedule presented on Plate 10:

SVE SYSTEM CONSTRUCTION

- Acquire building permits from the City of Anaheim Building Department
- Acquire electrical power from the City of Anaheim Public Utilities
- Horizontal transmission lines (inside the building to connect with the vertical extraction wells)
- Treatment compound installation
- Trenching and pipe installation (over 2000 feet of trench and piping)

WELL INSTALLATION ACTIVITIES

- Obtain well permits from the City of Anaheim
- Perform horizontal well pilot test
- Well installation (26 vertical multi-depth vapor extraction wells [3 extraction wells have already been installed] and 13 multi-depth vapor monitoring well [3 vapor monitoring wells have already been installed])
- Well installation (up to 11 horizontal vapor extraction wells)

Please note that the two critical path items on the schedule are acquisition of the building permit from the City of Anaheim and completion of electrical service connection from the City of Anaheim Public Works Department.

7.0 REFERENCES AND STANDARD LIMITATIONS

Two-Phase and Soil Vapor Extraction Pilot Test Studies Report, Former Northrop Grumman Y-12 Facility, Anaheim, California, Arcadis BBLES date March 2007 (ABBLES 2007).

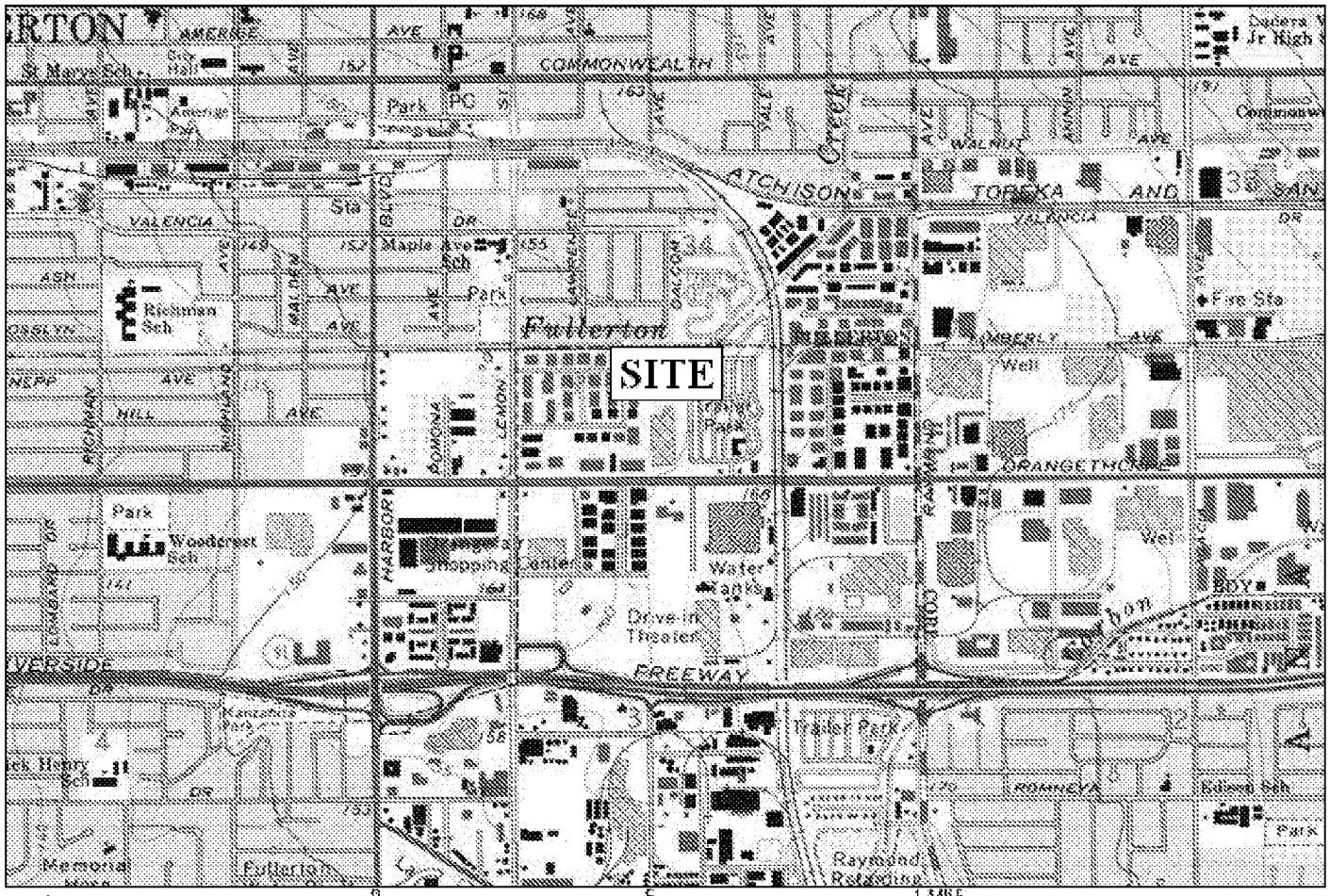
Pre-Design Investigation Report, Cleanup and Abatement Order No. R8-2003-108, Former Northrop Grumman Y-12 Facility, 301 E. Orangethorpe Avenue, Anaheim, California, Ninyo & Moore, date May 9, 2008 (Ninyo & Moore 2008).

Groundwater Remediation Plan, Former Y-12 Facility, 301 Orangethorpe Avenue, Anaheim, California, URS Corporation, date October 12, 2004 (URS 2004).

7.1 STANDARD LIMITATIONS

Services provided by EQC in the course of completing site investigation activities have been conducted in a manner consistent with the care and skill ordinarily exercised by members of the consulting industry. No other representation expressed or implied and no other warranty or guarantee is included or intended in this report, its opinions, or documentation.

EQC may have relied on information provided by third parties in the course of completing this work. The validity of this information has not been confirmed and EQC cannot warrant its accuracy. There is always a potential for the presence of unknown, unidentified, or unforeseen subsurface conditions and/or contamination. If new data are developed from future studies (which may include intrusive investigations, groundwater sampling, or other efforts), EQC should be requested to re-evaluate the conclusions of this report, and to provide amendments as appropriate.



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

EQUPOSE CORPORATION
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San Clemente, California 92672
Phone: 949 366 0266
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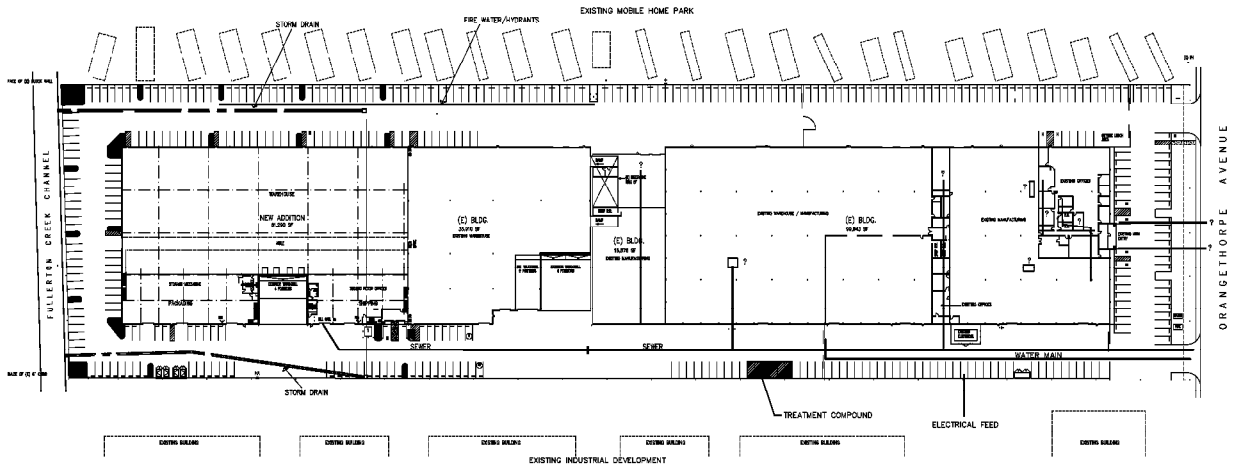
SITE VICINTY MAP

FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

PLATE: 1
REVISION NO: 0
DATE: 5/8/08

NGSC43919



LEGEND

SITE PLAN

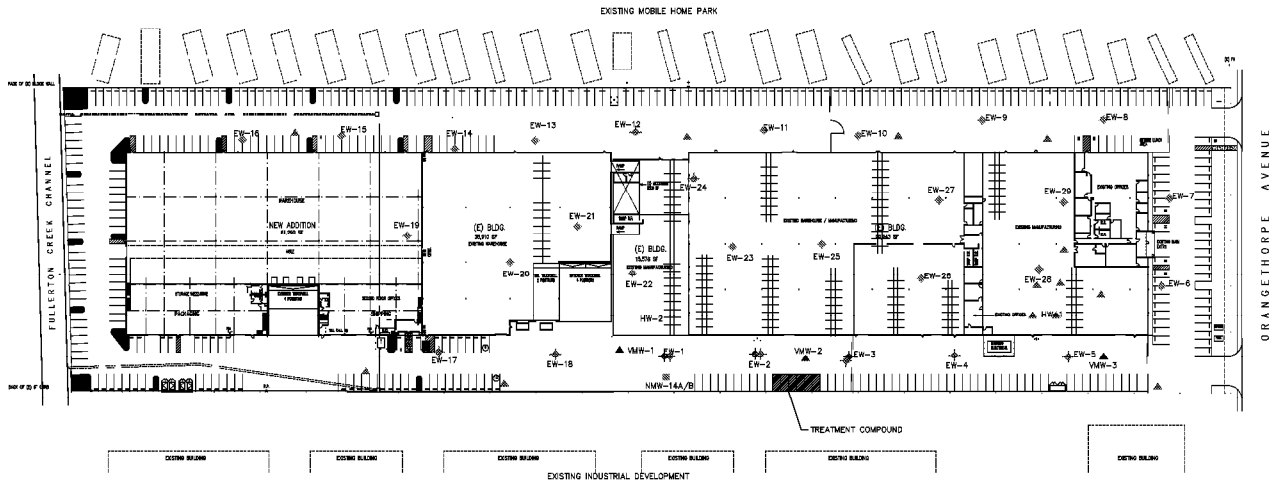
FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

EQUIPOISE CONSTRUCTION

PLATE: 2

DATE: 04/2008

NGSC43920



LEGEND

- EXTRACTION WELL CLUSTER - EXISTING
- EXTRACTION WELL CLUSTER - PROPOSED
- VAPOR MONITORING PROBE CLUSTER - EXISTING
- VAPOR MONITORING PROBE CLUSTER - PROPOSED
- MONITORING WELL CLUSTER - PROPOSED
- PROPOSED SVE/DPE WELL CLUSTER
- PROPOSED HORIZONTAL WELL - 7 and 15'
- PROPOSED HORIZONTAL WELL - 15'
- ESTIMATED RADIUS OF INFLUENCE (70 FEET)

0 30 APPROXIMATE SCALE

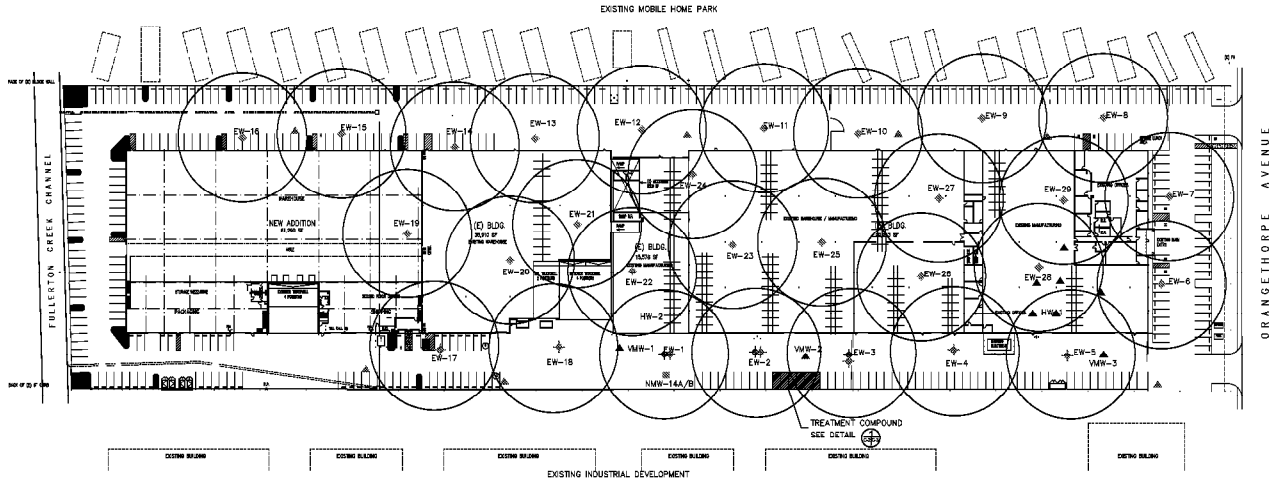
WELL LOCATIONS
FORMER YIZ FACILITY
3011 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

EQUIPOISE CORPORATION

PLATE 3

DATE 04/2009

NGSC43921



LEGEND

- EXTRACTION WELL CLUSTER - EXISTING
- EXTRACTION WELL CLUSTER - PROPOSED
- PROPOSED SVE/DPE WELL CLUSTER
- VAPOR MONITORING PROBE CLUSTER - EXISTING
- VAPOR MONITORING PROBE CLUSTER - PROPOSED
- MONITORING WELL CLUSTER - PROPOSED
- ESTIMATED RADIUS OF INFLUENCE (70 FEET)
- PROPOSED HORIZONTAL WELL - 7 and 15'
- PROPOSED HORIZONTAL WELL - 15'

0 30 APPROXIMATE SCALE

SITE PLAN WITH EXTRACTION WELLS WITH ROI

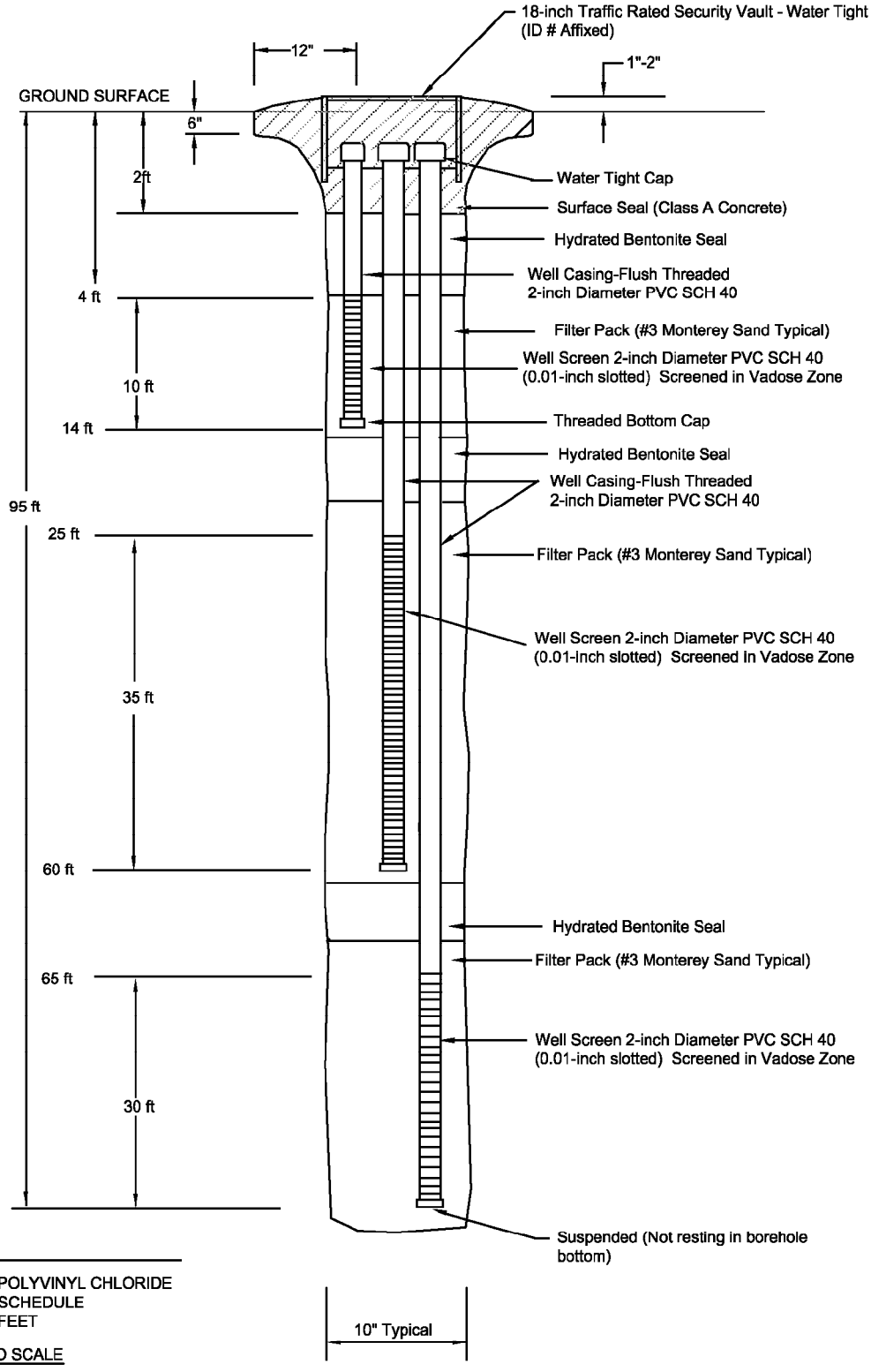
FORMER YIC FACILITY
301 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

EQUIPOISE CORPORATION

PLATE 4

DATE 04/2008

NGSC43922



LEGEND

PVC	POLYVINYL CHLORIDE
SCH	SCHEDULE
ft	FEET

NOT TO SCALE

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CONSTRUCTION DETAIL.DWG

SVE/DPE WELL CONSTRUCTION DETAIL
Former Y-12 Facility
Anaheim, California

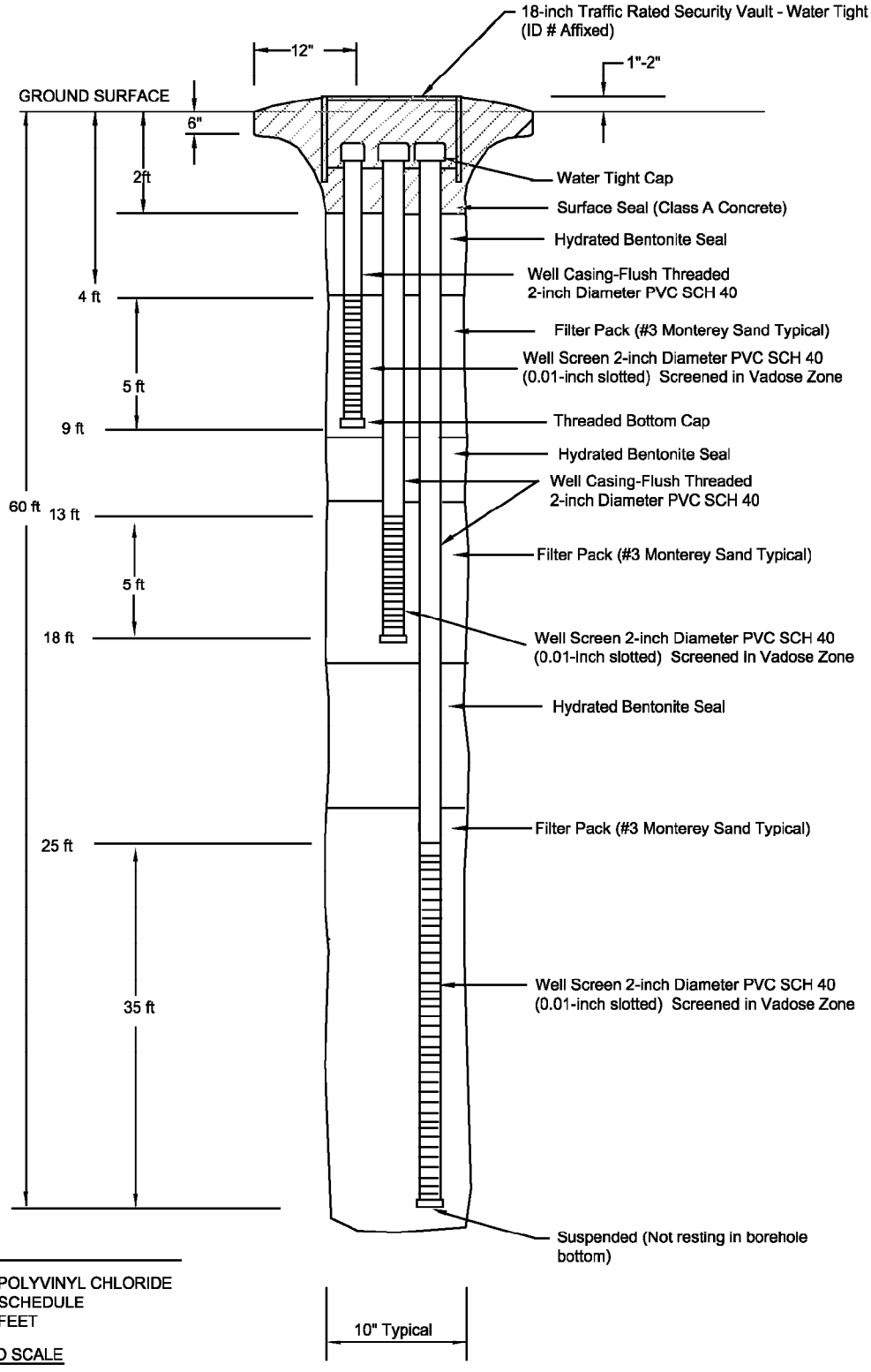
FIGURE: 5

REVISION NO: 0

DATE: 5/08

NGSC43923

MULTI-DEPTH- SOIL VAPOR EXTRACTION WELL



LEGEND

PVC	POLYVINYL CHLORIDE
SCH	SCHEDULE
ft	FEET

NOT TO SCALE

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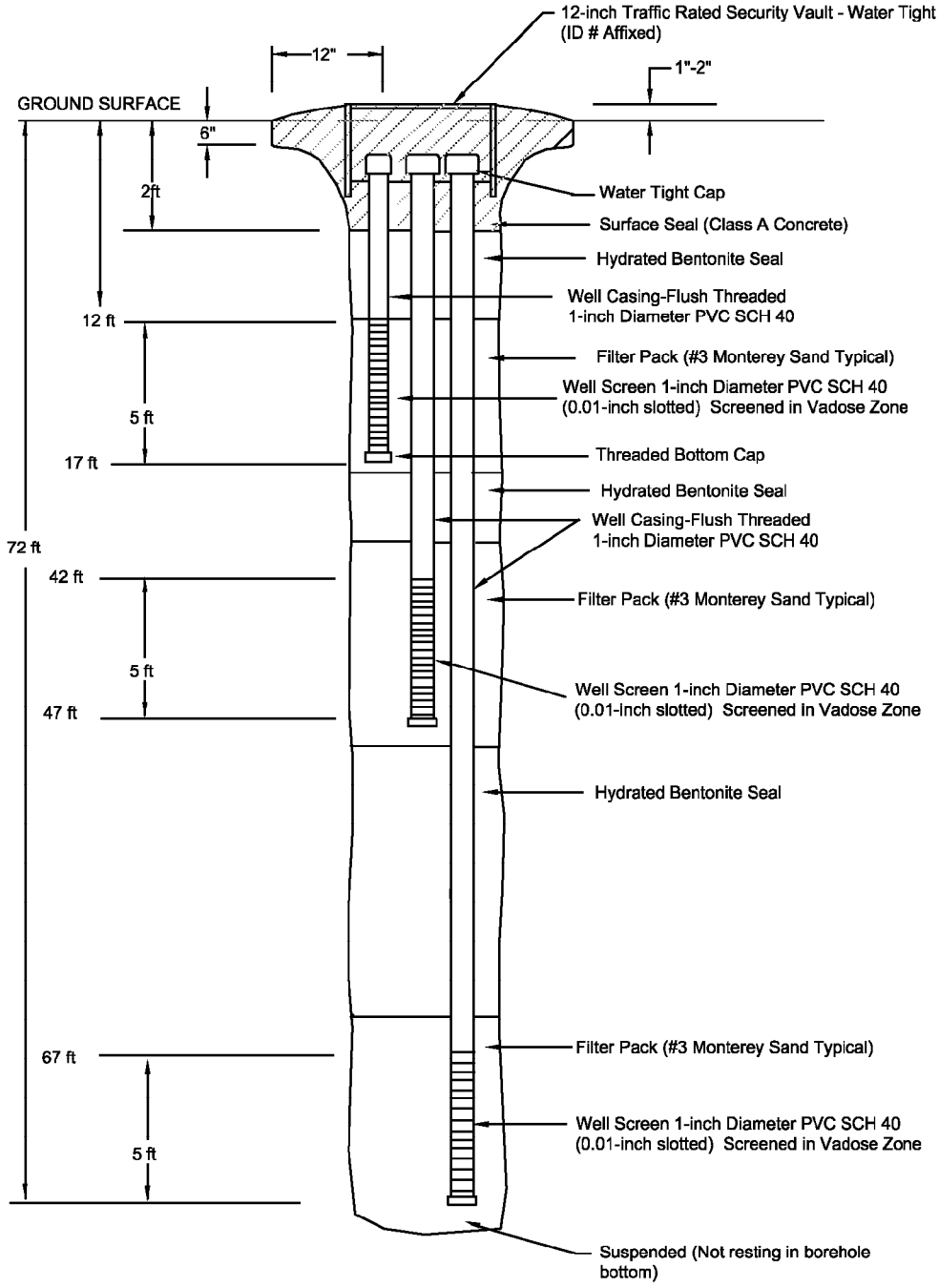
CONSTRUCTION DETAIL.DWG

SVE WELL
CONSTRUCTION DETAIL
Former Y-12 Facility
Anaheim, California

FIGURE: 6
REVISION NO: 0
DATE: 5/08

NGSC43924

VAPOR MONITORING PROBES COMPLETION DIAGRAM



LEGEND

PVC	POLYVINYL CHLORIDE
SCH	SCHEDULE
ft	FEET

NOT TO SCALE

8" Typical

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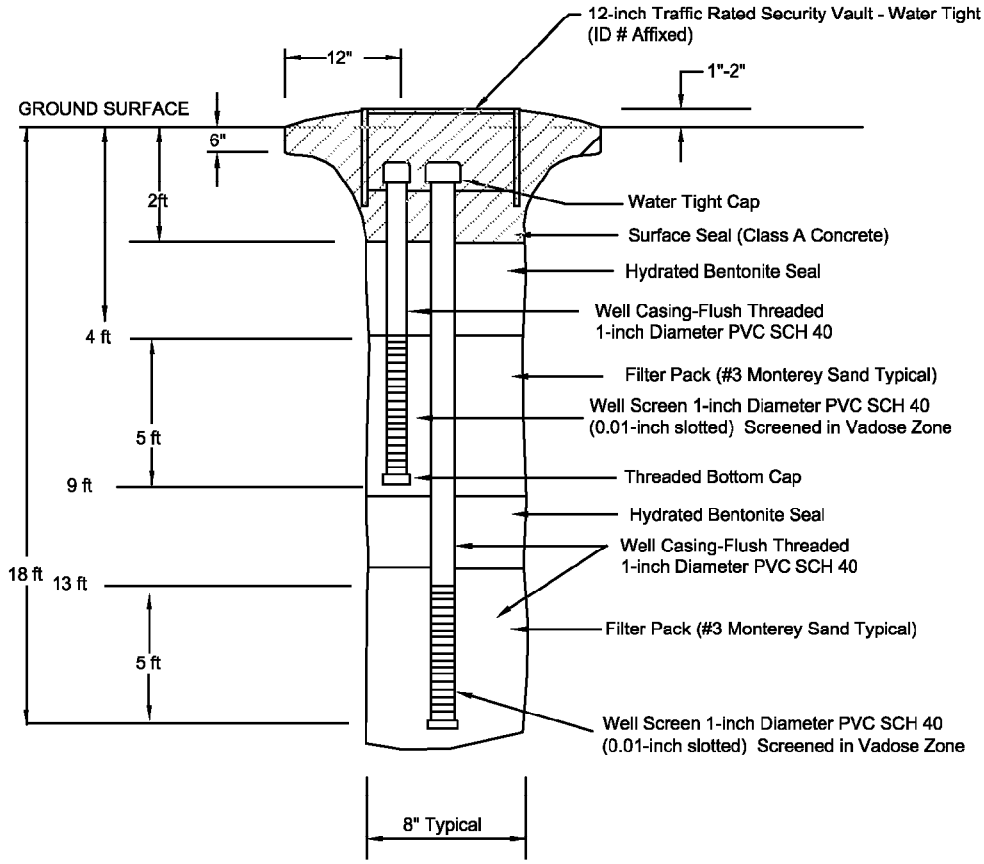
CONSTRUCTION DETAIL.DWG

VAPOR MONITORING PROBES
CONSTRUCTION DETAIL
Former Y-12 Facility
Anaheim, California

FIGURE: 7
REVISION NO: 0
DATE: 5/08

NGSC43925

TEMPORARY VAPOR MONITORING PROBE CONSTRUCTION DIAGRAM



LEGEND

PVC	POLYVINYL CHLORIDE
SCH	SCHEDULE
ft	FEET

NOT TO SCALE

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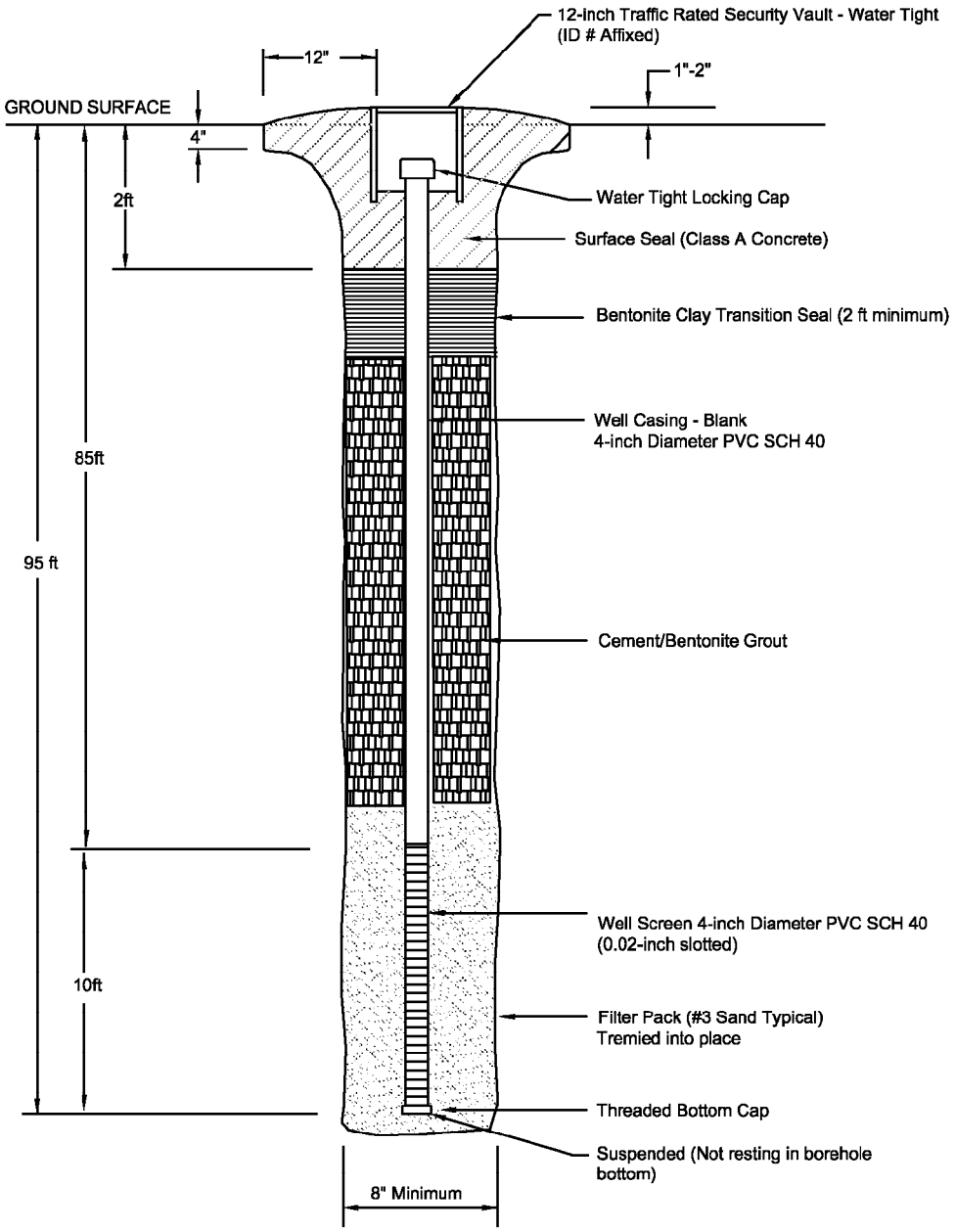
CONSTRUCTION DETAIL.DWG

TEMPORARY VAPOR MONITORING PROBES
CONSTRUCTION DETAIL
Former Y-12 Facility
Anaheim, California

FIGURE: 8
REVISION NO: 0
DATE: 5/08

NGSC43926

GROUNDWATER MONITORING WELL - NMW - 14A



LEGEND

PVC	POLYVINYL CHLORIDE
SCH	SCHEDULE
ft	FEET

NOT TO SCALE

EQUPOSE CORPORATION
1401 North El Camino Real, Suite 107
San Clemente, CA 92672
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Fax: 949.366.0281

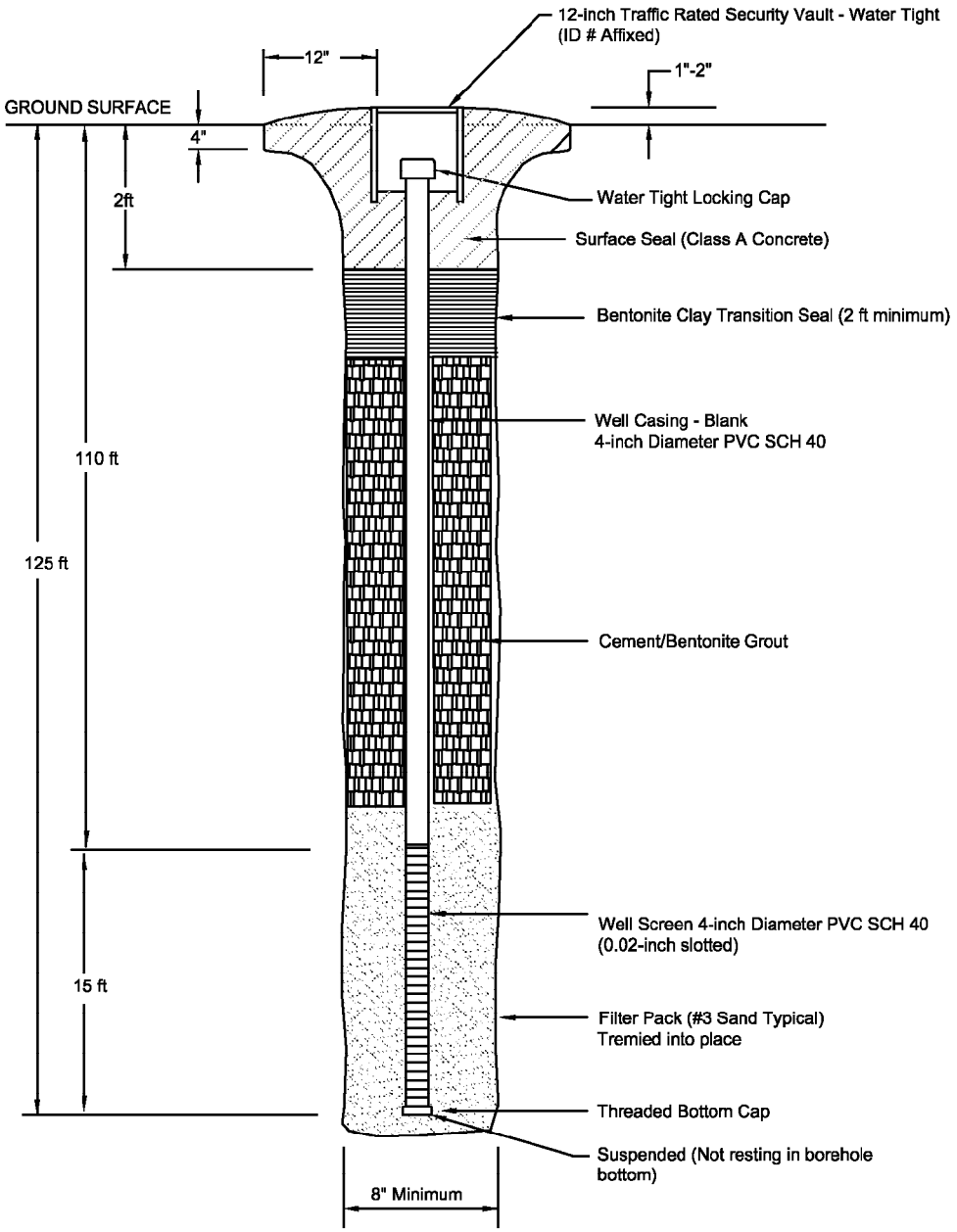
GMW CONSTRUCTION DETAIL.DWG

GROUNDWATER MONITORING WELL
CONSTRUCTION DETAIL
FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE, ANAHEIM, CA

FIGURE: 9A
REVISION NO:
DATE: 05/08

NGSC43927

GROUNDWATER MONITORING WELL - NMW - 14B



LEGEND

PVC	POLYVINYL CHLORIDE
SCH	SCHEDULE
ft	FEET

NOT TO SCALE

EQUPOSE CORPORATION
1401 North El Camino Real, Suite 107
San Clemente, CA 92672
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Fax: 949.366.0281

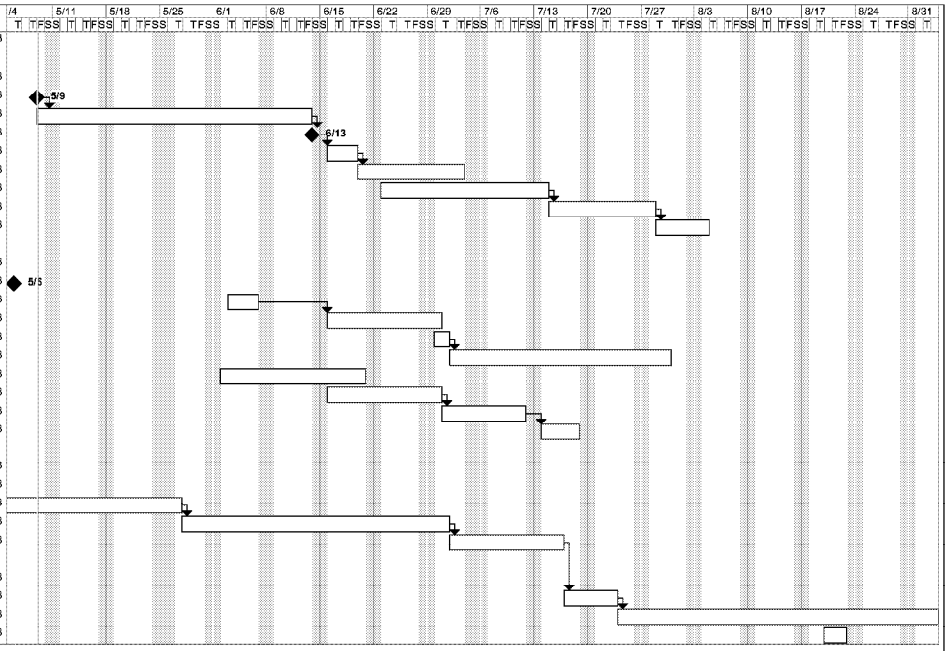
GMW CONSTRUCTION DETAIL.DWG

GROUNDWATER MONITORING WELL
CONSTRUCTION DETAIL
FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE, ANAHEIM, CA

FIGURE: 9B
REVISION NO:
DATE: 05/08

NGSC43928

ID	Task Name	Duration	Start	Finish
1	**Y-12 SVE SYSTEM INSTALLATION**	0 days	Tue 5/6/08	Tue 5/6/08
2				
3	**REMEDIATION SYSTEM CONSTRUCTION**	0 days	Tue 5/6/08	Tue 5/6/08
4	Submit Engineering Design for Building Permit	0 days	Fri 5/9/08	Fri 5/9/08
5	City Review for Building Permit	25 days	Fri 5/9/08	Fri 6/13/08
6	Building Permit Issued (Estimated at 5 weeks)	0 days	Fri 6/13/08	Fri 6/13/08
7	Mobilization of Construction	4 days	Mon 6/16/08	Thu 6/19/08
8	Treatment Compound Installation	10 days	Fri 6/20/08	Thu 7/3/08
9	Western SVE/DPE Network Installation	15 days	Mon 6/23/08	Mon 7/14/08
10	Eastern SVE Network Installation	10 days	Tue 7/15/08	Mon 7/28/08
11	Southern SVE Network Installation	5 days	Tue 7/29/08	Mon 8/4/08
12				
13	**WELL INSTALLATION ACTIVITIES**	0 days	Tue 5/6/08	Tue 5/6/08
14	Acquire Well Permit	0 days	Tue 5/6/08	Tue 5/6/08
15	Horizontal Well Pilot Test Well Installation	4 days	Tue 6/3/08	Fri 6/6/08
16	Horizontal Transmission Piping Installation	11 days	Mon 6/16/08	Mon 6/30/08
17	Horizontal Well Pilot Teet	2 days	Mon 6/30/08	Tue 7/1/08
18	Horizontal Vapor Extraction Well Installation	20 days	Wed 7/2/08	Wed 7/30/08
19	Vapor Extraction Well Installation - Exterior	15 days	Mon 6/2/08	Fri 6/20/08
20	Vapor Extraction Well Installation - Interior	11 days	Mon 6/16/08	Mon 6/30/08
21	Vapor Monitoring Well Installation	8 days	Tue 7/1/08	Fri 7/11/08
22	Collect Baseline Samples	5 days	Mon 7/14/08	Fri 7/18/08
23				
24	**ELECTRICAL SERVICE INSTALLATION**	0 days	Tue 5/6/08	Tue 5/6/08
25	Submit Electrical Service Application	0 days	Tue 4/29/08	Tue 4/29/08
26	Electrical Service Planning - City of Anaheim	20 days	Tue 4/29/08	Tue 5/27/08
27	Schedule Electrical Service	25 days	Wed 5/28/08	Tue 7/1/08
28	Install Electrical Service	10 days	Wed 7/2/08	Wed 7/16/08
29				
30	**SYSTEM STARTUP AND O&M**	0 days	Thu 7/17/08	Thu 7/17/08
31	System Startup	5 days	Thu 7/17/08	Wed 7/23/08
32	System O&M	30 days	Thu 7/24/08	Wed 9/3/08
33	Performance Monitoring	3 days	Wed 8/20/08	Fri 8/22/08



Project: Project Schedule for RAP
Date: Fri 5/9/08

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

NGSC43929

REMEDIATION SYSTEM INSTALLATION
SVE AND DPE SYSTEMS
NORTHROP GRUMMAN SYSTEMS CORPORATION
FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

DRAWING INDEX

PREPARED FOR:

NORTHROP GRUMMAN SYSTEMS CORPORATION
ONE HORNET WAY, PA 12/WS
EL SEGUNDO, CA 90245

PREPARED BY:

EQUIPOISE CORPORATION
1401 N. EL CAMINO REAL, SUITE 107
SAN CLEMENTE, CALIFORNIA 92672
PHONE: 949.366.0266
FAX: 949.366.0261

NO.	DATE	REVISIONS	BY	CHK

DRAWN: A.Q | PROJECT NO:
ENGINEER: P.S. | SCALE: AS NOTED
CHECKED: R.W.B. | APPROVED:
DATE: 03/08 | DATE: 03/08
FILE NAME: TITLE SHEET T-1.DWG

EQUIPOISE CORPORATION 1401 North El Camino Real, Suite 107 San Clemente, CA 92672 Phone: 949.366.0266 Fax: 949.366.0261

TITLE SHEET
FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE, ANAHEIM, CA

FIGURE: T-1
SHEET: 1 of 17
REVISION NO: 0
DATE: 04/08

NGSC43930

GENERAL NOTES:

1. CONSTRUCTION SITES SHALL BE MAINTAINED IN SUCH A CONDITION THAT AN ANTICIPATED STORM DOES NOT CARRY WASTES OR POLLUTANTS OFF THE SITE. DISCHARGES OF MATERIAL OTHER THAN STORMWATER ARE ALLOWED ONLY WHEN NECESSARY FOR PERFORMANCE AND COMPLETION OF CONSTRUCTION PRACTICES AND WHERE THE DO NOT; CAUSE OR CONTRIBUTE TO A VIOLATION OF ANY WATER QUALITY STANDARDS; CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR NUISANCE; OR CONTAIN A HAZARDOUS SUBSTANCE IN A QUANTITY REPORTABLE UNDER FEDERAL REGULATIONS 40 CFR PARTS 117 AND 302. POTENTIAL POLLUTANTS INCLUDE BUT ARE NOT LIMITED TO; SOLID OR LIQUID CHEMICAL SPILLS; WASTES AND SOLVENTS; ASBESTOS FIBERS, PAINT FLAKES OR STUCCO FRAGMENTS; FUELS, OILS, LUBRICANTS, AND HYDRAULIC, RADIATOR OR BATTERY FLUIDS; FERTILIZERS, VEHICLE/EQUIPMENT WASH WATER AND CONCRETE WASH WATER; CONCRETE DETERGENT OR FLOATABLE WASTES; WASTES FROM ANY ENGINE/EQUIPMENT STEAM CLEANING OR CHEMICAL DEGREASING; AND SUPERCHLORINATED POTABLE WATER LINE FLUSHINGS. DURING CONSTRUCTION DISPOSAL OF SUCH MATERIAL SHOULD OCCUR IN A SPECIFIED AND CONTROLLED TEMPORARY AREA ON SITE, PHYSICALLY SEPARATED FROM POTENTIAL STORM WATER RUNOFF, WITH ULTIMATE DISPOSAL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REQUIREMENTS.

2. DEWATERING OF CONTAMINATED GROUNDWATER, OR DISCHARGING CONTAMINATED SOLID VIA SURFACE EROSION IS PROHIBITED. DEWATERING OF NON-CONTAMINATED GROUNDWATER REQUIRES A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT FROM THE RESPECTIVE STATE REGIONAL WATER QUALITY CONTROL BOARD.

3. STOCKPILED SOILS WILL BE COVERED ABOVE AND BELOW WITH PLASTIC SHEETING.

4. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE CITY OF ANAHEIM REQUIREMENTS.

5. CITY OF ANAHEIM BUILDING INSPECTOR TO BE NOTIFIED 48 HOURS PRIOR TO ANY CONSTRUCTION ACTIVITIES AT THE BUILDING DIVISION (714) 765-5153.

6. THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED FROM AVAILABLE RECORDS. APPROVAL OF THESE PLANS BY THE CITY OF ANAHEIM DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OR COMPLETENESS OF THE LOCATION OR THE EXISTENCE OF ANY UNDERGROUND UTILITY PIPE OR STRUCTURE WITHIN THE LIMITS OF THE PROJECT. THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEANS TO PROTECT THE UTILITY NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

7. SAFETY RESPONSIBILITY: CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGATED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF OWNER OR THE ENGINEER.

8. CONSTRUCTION ACTIVITIES INCLUDING MAINTENANCE OF EQUIPMENT WITHIN ONE HALF MILE OF HUMAN OCCUPANCY SHALL NOT BE CONDUCTED BETWEEN THE HOURS OF 8:00 PM AND 7:00 AM DAILY, ON SUNDAY OR A FEDERAL HOLIDAY.

9. IMPORT SOIL SHALL BE GRANULAR MATERIAL WITH LOW EXPANSION POTENTIAL AND SHALL BE COMPACTED TO AT LEAST 90 %.

10. THE CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTORS' AND SUBCONTRACTORS' COMPLIANCE WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS" OF THE U.S. DEPARTMENT OF LABOR OR WITH THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS "CONSTRUCTION SAFETY ORDERS."

11. THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

12. IN CASE OF AN EMERGENCY CALL:
RICHARD W. BLACKMER AT (949) 366-0266 OR CELL (805) 508-1136 EQUIPOISE CORP.

13. NOTIFICATION TO DIG ALERT WILL BE MADE AT LEAST THREE DAYS PRIOR TO ANY FIELD WORK. DIG ALERT (800) 227-2600

14. THE CONTRACTOR SHALL SUPPLY THE ENGINEER WITH A DETAILED PROJECT SCHEDULE BEFORE COMMENCING WORK AND MAKE EVERY POSSIBLE EFFORT TO STAY ON THAT SCHEDULE, INCLUDING WORKING OVERTIME OR HIRING ADDITIONAL EMPLOYEES AT THE CONTRACTOR'S EXPENSE, SHOULD THE PROJECT FALL BEHIND SCHEDULE.

15. THE CONTRACTOR SHALL PROVIDE PROOF OF COVERAGE BY INSURANCE ADEQUATE TO INDEMNIFY OWNER AGAINST LOSS, DAMAGE, OR INJURY CLAIM WHICH MIGHT ARISE AS A RESULT OF THIS PROJECT. OWNER WILL SPECIFY AMOUNT OF COVERAGE IN CONTRACT.

16. THE CONTRACTOR'S FINAL INVOICE WILL BE PROCESSED FOR PAYMENT ONLY AFTER THE SITE HAS BEEN INSPECTED BY THE ENGINEER IN COMPANY WITH THE CONTRACTOR. AND THE ENGINEER HAS ACCEPTED THE PROJECT AS COMPLETE.

17. CONTRACTOR OR FABRICATOR ACCEPTS THE PREMISES IN "AS IS" CONDITION. OWNER OR ENGINEER SHALL NOT BE RESPONSIBLE FOR THE ACTS OR OMISSIONS, CONSTRUCTION MEANS , METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR THE SAFETY PRECAUTIONS AND PROGRAMS OF THE CONTRACTOR, SUBCONTRACTORS, OR ANY OTHER PERSONS DOING WORK ON THIS PROJECT.

18. ALL WORK SHALL BE PERFORMED AND COMPLETED IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL CODES.

19. SCHEDULE 80 PVC PIPE IS TO BE USED ABOVEGROUND FOR ULTRAVIOLET LIGHT PROTECTION.

20. WELL BOXES ARE TO BE TRENCHED IN PLACE AFTER WELL INSTALLATION IS COMPLETE. WELL BOXES WILL BE SET BELOW GROUNDSURFACE TO MATCH EXISTING GRADE DURING TRENCHING ACTIVITIES. CONCRETE CUTTING AND OVEREXCAVATION OF SOILS A MINIMUM OF 6 INCHES ON EACH SIDE FOR PROPER SETTING OF WELL BOX IS REQUIRED.

GENERAL NOTES: TRENCHING, BACKFILLING, AND RESURFACING

EXISTING IMPROVEMENTS:

1. THE CONTRACTOR SHALL MAINTAIN IN OPERATING CONDITION AND PROTECT FROM DAMAGE ALL EXISTING IMPROVEMENTS INCLUDING UTILITIES, ROADS, STREETS, SIDEWALKS, DRIVES, POWER AND TELEPHONE LINES, GAS LINES, WATER LINES, SEWERS, GUTTERS AND OTHER DRAINS ENCOUNTERED, AND REPAIR TO THE SATISFACTION OF THE ENGINEER ANY SURFACE OR SUBSURFACE IMPROVEMENTS DAMAGED DURING THE COURSE OF THE WORK. WHERE AND IF SHOWN ON THE PLANS, THE LOCATIONS AND EXISTENCE OR NONEXISTENCE OF UNDERGROUND UTILITIES ARE NOT GUARANTEED. THE CONTRACTOR SHALL CONTACT THE VARIOUS UTILITY COMPANIES TO DETERMINE AND/OR VERIFY SUCH INFORMATION PRIOR TO PROCEEDING WITH THE WORK. HE SHALL MAKE REASONABLE AND SATISFACTORY PROVISIONS FOR THE MAINTENANCE OF TRAFFIC ON STREETS, DRIVES, WALKWAYS AND AT STREET CROSSINGS AND IF NECESSARY TO PROVIDE TEMPORARY WALKWAYS AND BRIDGES FOR CROSSING OF THE OPEN TRENCH AS DIRECTED.

2. ALL EXCAVATIONS OF EVERY DESCRIPTION AND OF WHATEVER SUBSTANCES ENCOUNTERED SHALL BE PERFORMED TO THE DEPTHS INDICATED ON THE DRAWINGS OR AS SPECIFIED HEREIN. EXCAVATION SHALL BE MADE BY THE OPEN CUT METHOD EXCEPT AS OTHERWISE SPECIFIED OR SHOWN ON THE DRAWINGS. EXCAVATION METHODS SHALL GENERALLY MEET OR EXCEED OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) CONSTRUCTION INDUSTRY STANDARDS.

3. ALL EXCAVATED MATERIALS NOT REQUIRED FOR FILL OR BACKFILL SHALL BE REMOVED AS WASTE AS DIRECTED. THE BANKS OF SHALLOW TRENCHES SHALL BE KEPT AS NEARLY VERTICAL AS PRACTICABLE AND WHERE REQUIRED SHALL BE PROPERLY SHEETED AND BRACED.

EXCAVATIONS:

1. TRENCHES AND OTHER EXCAVATIONS SHALL NOT BE BACKFILLED UNTIL ALL REQUIRED TESTS ARE PERFORMED AND THE WORK HAS BEEN APPROVED BY THE ENGINEER. THE TRENCHES SHALL BE CAREFULLY BACKFILLED WITH THE EXCAVATED MATERIALS APPROVED FOR BACKFILLING CONSISTING OF EARTH, LOAM, SANDY CLAY, SAND AND GRAVEL, SOFT SHALE, OR OTHER APPROVED MATERIALS. NO MATERIAL SHALL BE USED FOR BACKFILLING THAT CONTAINS MULCH, OTHER UNSTABLE MATERIALS, STONES, BLASTED ROCK, BROKEN CONCRETE OR PAVEMENT, OR OTHER HARD MATERIALS HAVING ANY DIMENSION GREATER THAN 4 INCHES; OR LARGE CLODS OF EARTH, DEBRIS, OR EARTH WITH AN EXCEPTIONALLY HIGH VOID CONTENT.

2. FOR BACKFILL UP TO A LEVEL 1-FOOT OVER THE TOP OF PRESSURE PIPELINES AND 2-FEET ABOVE THE TOP OF GRAVITY PIPELINES, ONLY SELECTED MATERIALS SHALL BE USED. SELECT MATERIALS SHALL BE FINELY DIVIDED MATERIAL FREE FROM DEBRIS, ORGANIC MATERIAL AND STONE, AND MAY BE SUITABLE JOB EXCAVATED MATERIAL OR SHALL BE PROVIDED BY THE CONTRACTOR FROM OTHER SOURCES. THE BACKFILL SHALL BE PLACED IN UNIFORM LAYERS NOT EXCEEDING 6 INCHES IN DEPTH. EACH LAYER SHALL BE MOISTENED AND CAREFULLY AND UNIFORMLY TAMPED WITH MECHANICAL TAMPERS OR OTHER SUITABLE TOOLS. EACH LAYER SHALL BE PLACED AND TAMPED UNDER THE PIPE HAUNCHES WITH CARE AND THOROUGHNESS SO AS TO ELIMINATE THE POSSIBILITY OF VOIDS OR LATERAL DISPLACEMENT.

3. THE REMAINDER OF THE BACKFILL MATERIAL SHALL THEN BE PLACED AND COMPACTED ABOVE THE LEVEL SPECIFIED ABOVE. IN AREAS NOT SUBJECT TO TRAFFIC, THE BACKFILL SHALL BE PLACED IN 12-INCH LAYERS AND EACH LAYER MOISTENED AND COMPACTED TO A DENSITY APPROXIMATING THAT OF THE SURROUNDING EARTH. UNDER ROADWAYS, DRIVEWAYS, PAVED AREAS, PARKING LOTS, ALONG ROADWAY SHOULDERS AND OTHER AREAS SUBJECT TO TRAFFIC, THE BACKFILL SHALL BE PLACED IN 6 INCH LAYERS AND EACH LAYER MOISTENED AND COMPACTED TO DENSITY AT LEAST EQUAL TO THAT OF THE SURROUNDING EARTH SO THAT TRAFFIC CAN BE RESUMED IMMEDIATELY AFTER BACKFILLING IS COMPLETED. ANY TRENCHES WHICH ARE IMPROPERLY BACKFILLED, OR WHERE SETTLEMENT OCCURS, SHALL BE REOPENED TO THE DEPTH REQUIRED FOR PROPER COMPACTION, THEN REFILLED AND COMPACTED WITH THE SURFACE RESTORED TO THE REQUIRED GRADE COMPACTION. ALONG ALL PORTIONS OF THE TRENCHES NOT LOCATED IN ROADWAYS, THE GROUND SHALL BE GRADED TO A REASONABLE UNIFORMITY AND THE MOUNDING OVER THE TRENCHES LEFT IN A NEAT CONDITION SATISFACTORY TO THE ENGINEER.

RESURFACING:

1. WHERE NECESSARY EXISTING PAVEMENTS SHALL BE REMOVED AND REPLACED, THE APPLICABLE SPECIFICATIONS OF THE DEPARTMENT OF TRANSPORTATION OR LOCAL AUTHORITY SHALL GOVERN THIS WORK. JOINTS SHALL BE SAWED, UNLESS JOINTS EQUALLY UNIFORM IN THE OPINION OF THE ENGINEER RESULT FROM OTHER MEANS.

NO.	DATE	REVISIONS	BY	CHK

DRAWN: A.Q. | PROJECT NO:
ENGINEER: P.S. | SCALE: AS NOTED
CHECKED: R.W.B. | APPROVED:
DATE: 03/08 | DATE: 03/08
FILE NAME: GENERAL NOTES SHEET T-2

EQUIPOISE CORPORATION
1401 North El Camino Real, Suite 107
San Clemente, CA 92672
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GENERAL NOTES SHEET

FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE, ANAHEIM, CA

FIGURE: T-2
SHEET: 2 of 18
REVISION NO: 0
DATE: 05/08

NGSC43931

SITE SYMBOLS

- MONITORING WELL
- PROPOSED MONITORING WELL
- SOIL BORING
- RECOVERY WELL
- PROPOSED SVE WELL
- EXISTING SVE WELL
- PROPOSED ASSVE WELL
- EXISTING ASSVE WELL
- GROUND WATER LEVEL
- UTILITY POLE
- LIGHT POLE
- MANHOLE
- CATCH BASIN
- TREE/SHRUB
- HYDRANT
- TBM — TEMPORARY BENCHMARK
- SURVEY MONUMENT
- FENCE LINE
- RAILROAD TRACKS
- R/W — RIGHT OF WAY
- PROPERTY LINE
- OVERHEAD ELECTRIC LINE
- UNDERGROUND ELECTRIC LINE
- GAS LINE
- OVERHEAD TELEPHONE LINE
- UNDERGROUND TELEPHONE LINE
- WATER LINE
- SANITARY SEWER LINE
- STORM DRAIN LINE
- PROCESS LINES ABOVE GRADE
- PROCESS LINES BELOW GRADE
- PNEUMATIC LINES

SYMBOL SPECIFICATION

INSTRUMENTATION:

INSTRUMENT TYPE — PI
SYSTEM DESIGNATION — VE1 — SYSTEM POSITION NUMBER

- REFERENCE POINT FOR DESIGN ONLY NOT ACTUAL INSTALLED INSTRUMENT. OPTIONAL FIELD MOUNTED INSTRUMENT TO BE INSTALLED AT THIS LOCATION IF CHOSEN.
- LOCAL MOUNTED INSTRUMENT
- INSTRUMENTS WITH INPUTS OR OUTPUTS AT THE SITE CONTROL PANEL
- PILOT LIGHT OR ALARM INDICATOR

SYSTEM DESIGNATION:

ASW	AIR SPARGE WELL & MANIFOLD
VEW	VAPOR EXTRACTION WELL & MANIFOLD
DPW	DUAL PHASE WELL & MANIFOLD
ERW	ELECTRIC RECOVERY WELL & PUMP
PRW	PNEUMATIC RECOVERY WELL & PUMP
VER	VAPOR EXTRACTION REGENERATIVE BLOWER
VEP	VAPOR EXTRACTION POSITIVE DISPLACEMENT
ASV	AIR SPARGE ROTARY VANE COMPRESSOR
ASB	AIR SPARGE POSITIVE DISPLACEMENT BLOWER
DPO	DUAL PHASE SEALED LIQUID RING PUMP
DPL	DUAL PHASE LIQUID RING PUMP
DPB	DUAL PHASE POSITIVE DISPLACEMENT BLOWER
OW	OIL- WATER SEPARATOR SYSTEM
STL	AIR STRIPPER LOW PROFILE
VC	VAPOR PHASE CARBON
LC	LIQUID PHASE CARBON

INSTRUMENT TYPE/DESIGNATION:

PI	PRESSURE INDICATOR
PS	PRESSURE SWITCH
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
HS	HAND SWITCH
DPS	DIFFERENTIAL PRESSURE SWITCH
DPI	DIFFERENTIAL PRESSURE INDICATOR
PC	PRESSURE CONTROL
PAH	PRESSURE ALARM HIGH
PAL	PRESSURE ALARM LOW
FI	FLOW INDICATOR
FM	FLOW METER
FQI	FLOW METER (TOTALIZING)
FS	FLOW SWITCH
TI	TEMPERATURE INDICATOR
TSH	TEMPERATURE SWITCH HIGH
TSL	TEMPERATURE SWITCH LOW
TT	TEMPERATURE TRANSDUCER
TAH	TEMPERATURE ALARM HIGH
TAL	TEMPERATURE ALARM LOW
LSLL	LEVEL SWITCH LOW LOW
LSL	LEVEL SWITCH LOW
LSM	LEVEL SWITCH MIDRANGE
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH HIGH
LAL	LEVEL ALARM LOW
LAH	LEVEL ALARM HIGH
CP	CAPACITIVE SENSOR/PROBE
S	SAMPLE PORT

DRAWING NOMENCLATURE

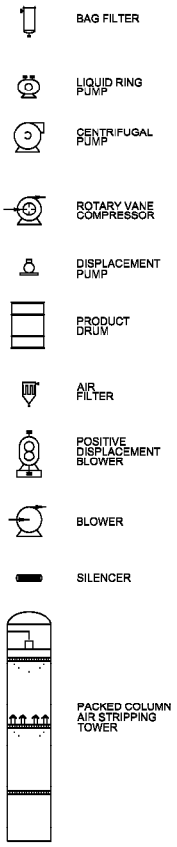
[1] UNDER NOTE SECTION, NOTE WITH BOX IS IDENTIFIED ON THE DRAWING WITH CORRESPONDING NUMBERED BOX.

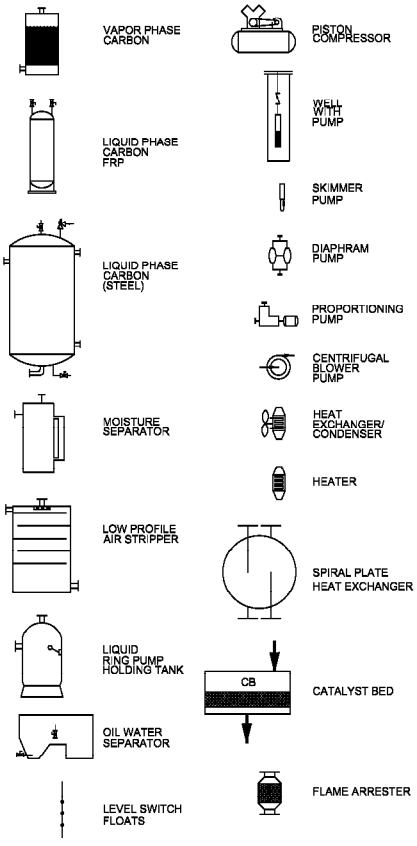
ARCHITECTURAL SYMBOL DESIGNATIONS

- 1 — OBJECT IDENTIFICATION
- XX — REVISION REFERENCE NUMBER
- XX — ROOM/SPACE IDENTIFICATION
- 2 — A — HORIZONTAL GRID REFERENCE LINE
- X / XXX — INDICATES SECTION/DETAIL NUMBER; INDICATES DRAWING SHEET ON WHICH SECTION/DETAIL IS SHOWN
- [1/A-1] — INDICATES SECTION/DETAIL NUMBER; INDICATES DRAWING SHEET ON WHICH SECTION/DETAIL IS SHOWN
- X / XXX — INDICATES AREA SHOWN IN REFERENCED DETAIL
- X / XXX — ELEVATION REFERENCE DRAWING NUMBER
- X / XXX — INDICATES SECTION NUMBER; INDICATES DRAWING SHEET ON WHICH SECTION IS SHOWN; X / XXX — SECTION CUT
- X / XXX — TITLE; SCALE

NO.	DATE	REVISIONS	BY	CHK	DRAWN: A.Q	PROJECT NO:	EQUIPOISE CORPORATION 1401 North El Camino Real, Suite 107 San Clemente, CA 92672 Phone: 949.369.0966 Fax: 949.498.0581	SYMBOLS AND LEGEND SHEET A	FIGURE: T-3
					ENGINEER: P.S.	SCALE: AS NOTED			SHEET: 3 of 18
					CHECKED: R.W.B	APPROVED:		FORMER Y-12 FACILITY 301 ORANGETHORPE AVENUE, ANAHEIM, CA	REVISION NO: 0
					DATE: 03/08	DATE: 03/08	FILE NAME: SYMBOLS AND LEGEND SHEET A		DATE: 03/08

NGSC43932





CONTROL VALVE BODIES:

- BALL VALVE
- GATE VALVE
- GLOBE VALVE
- BUTTERFLY VALVE
- SWING CHECK VALVE
- DIAPHRAGM VALVE
- BALL CHECK VALVE
- NEEDLE VALVE
- 3 WAY VALVE
- 4 WAY VALVE
- FOOT VALVE

ACTUATORS & REGULATORS:

- GEAR ACTUATOR
- PRESSURE RELIEF
- DIAPHRAGM ACTUATOR
- HYDRAULIC ACTUATOR
- SOLENOID ACTUATOR
- MOTOR ACTUATOR
- DIGITAL ACTUATOR
- WATER ACTUATOR
- REGULATOR
- FLOW INDICATOR
- PRESSURE OR VACUUM RELIEF VALVE

FLOW MEASURING DEVICE SYMBOLS:

- SINGLE PORT PITOT TUBE
- AVERAGING PITOT TUBE
- POSITIVE DISPLACEMENT FLOW INDICATOR
- VORTEX SENSOR
- SONIC FLOW METER
- ROTAMETER FLOW INDICATOR
- TARGET TYPE SENSOR
- WEIR
- VENTURI TYPE FLOW ELEMENT
- FLOW NOZZLE
- ORIFICE PLATE FLOW ELEMENT

FITTINGS & PIPING

- VICTAULIC CONNECTOR
- FLANGED CONNECTION
- SCREWED CONNECTION
- UNION
- COUPLING
- RUPTURE DISK
- REDUCER
- STRAINER
- FLOW RESTRICTOR
- FLEX HOSE
- CAM LOCK
- REMOVABLE CLEAR PIPE
- HOSE CONNECTION
- PNEUMATIC QUICK CONNECT
- PLUG
- PIPE CAP
- SLIP UPDRAFT VENT CAP
- ELBOW - TURNED UP
- ELBOW - TURNED DOWN
- ELBOW - 90°
- ELBOW - 45°
- ELBOW - LONG RADIUS
- REDUCING ELBOW
- TEE REDUCING
- TEE (OUTLET UP)
- TEE (OUTLET DOWN)
- TEE

VALVE ABBREVIATIONS

N.C. - NORMALLY CLOSED
N.O. - NORMALLY CLOSED
MAN - MANUAL

MATERIAL SPECIFICATON:

PV -	POLYVINYL CHLORIDE
GM -	GALVANIZED
RC -	RIGID COPPER
IR -	IRON
ABS-	ACRYLONITRILE BUTADENE STYRENE
FL -	FLEX

PROCESS LINE INDICATORS

- FLOW DIRECTION
- MAJOR PROCESS
- MINOR PROCESS
- WATER/AIR PIPING
- AIR PIPING
- INSTRUMENTATION CONTROLS
- PNEUMATIC LINE
- CONNECTING LINE
- CROSSOVER LINE

PROCESS LINE ABBREVATIONS

ES -	ELECTRIC SUPPLY
GS -	GAS SUPPLY
HS -	HYDRAULIC SUPPLY
NS -	NITROGEN SUPPLY
SS -	STEAM SUPPLY
W -	WATER SUPPLY
V -	VACUUM
VR -	VAPOR REMOVAL
TF -	TOTAL FLUIDS
AP -	ACCESS PIPE / CONDUIT
SA -	SPARGE AIR
PN -	PNEUMATIC SUPPLY

LINE DESIGNATION:

2 - VR - 01 - PV

2 = SIZE IN INCHES; VR = PROCESS; 01 = LINE NUMBER; PV = MATERIAL SPECIFICATION

NO.	DATE	REVISIONS	BY	CHK

DRAWN: A.Q. | PROJECT NO:
ENGINEER: P.S. | SCALE: AS NOTED
CHECKED: R.W.B. | APPROVED:
DATE: 03/08 | DATE: 03/08

EQUIPOISE CORPORATION
1401 North El Camino Real, Suite 107
San Clemente, CA 92672
Phone: 949.369.0966
Fax: 949.498.0581

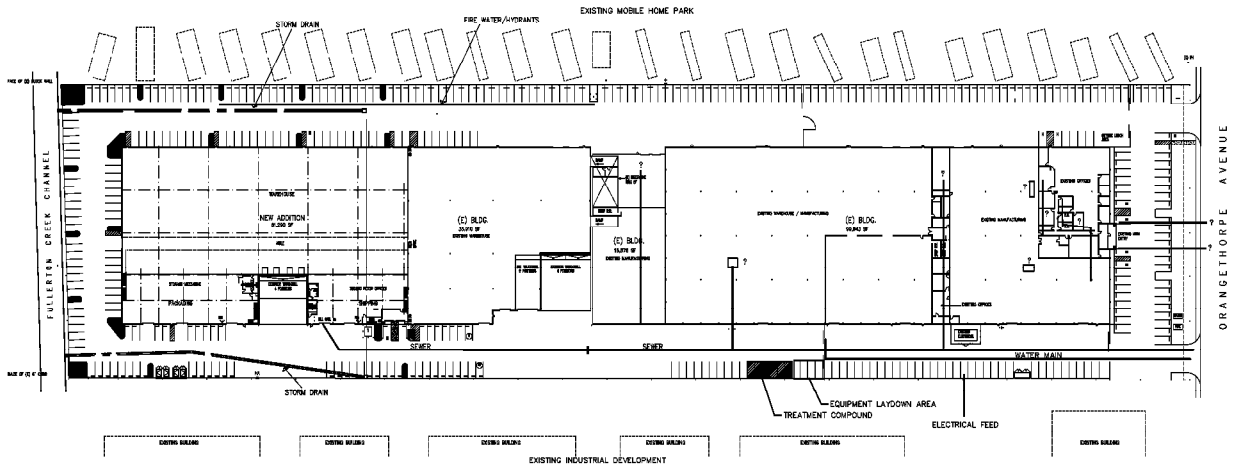
FILE NAME: Symbol and Legend Sheet B.dwg

SYMBOL AND LEGEND SHEET B

FORMER Y-12 FACILTY
301 ORANGETHORPE AVENUE, ANAHEIM, CA

FIGURE: T-4
SHEET: 4 of 18
REVISION NO: 0
DATE: 03/08

NGSC43933



LEGEND

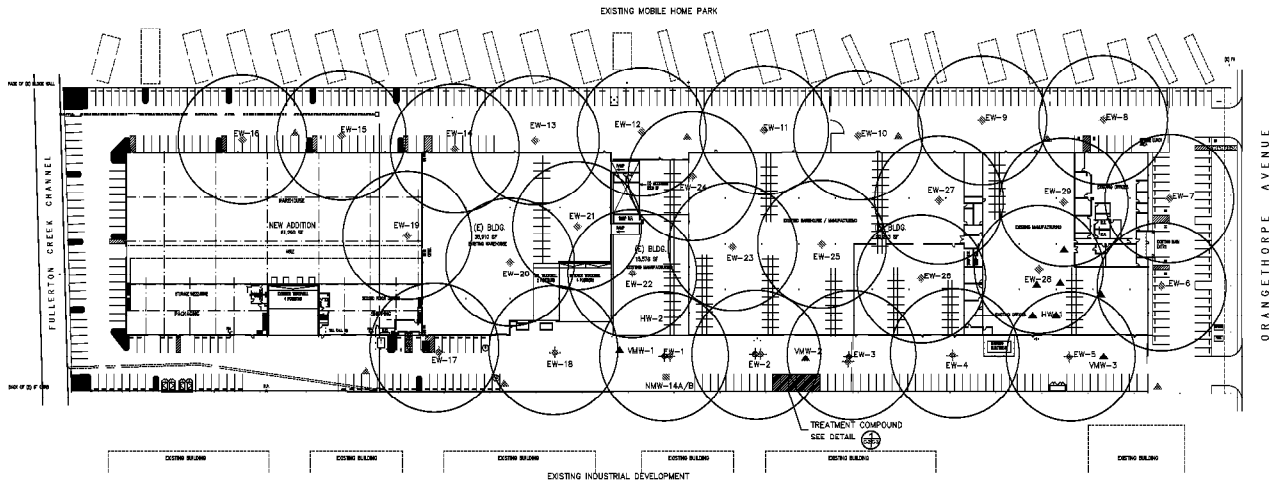
SITE PLAN WITH APPROXIMATE LOCATION OF EXISTING UTILITY LINES

FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

EQUIPOSE
CONSTRUCTION

PLATE: C-1
SHEET: 5 of 1R
REVISION NO:
DATE: 04/2008

NGSC43934



LEGEND

- EXTRACTION WELL CLUSTER - EXISTING
- EXTRACTION WELL CLUSTER - PROPOSED
- SVE/DPE WELL CLUSTER - PROPOSED
- VAPOR MONITORING PROBE CLUSTER - EXISTING
- VAPOR MONITORING PROBE CLUSTER - PROPOSED
- MONITORING WELL CLUSTER - PROPOSED
- ESTIMATED RADIUS OF INFLUENCE (70 FEET)
- PROPOSED HORIZONTAL WELL - 7 and 15'
- PROPOSED HORIZONTAL WELL - 15'

0 30 APPROXIMATE SCALE

SITE PLAN WITH EXTRACTION WELLS WITH ROI

FORMER YIC FACILITY
301 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

EQUIPOISE CORPORATION

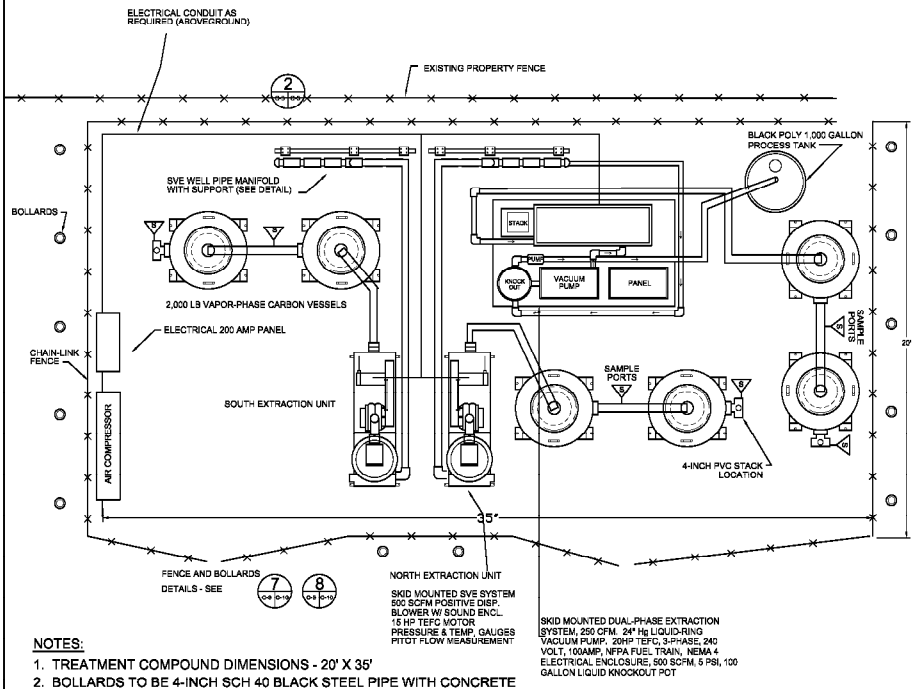
PLATE C-2

SHEET 6 of 18

REVISION NO:

DATE 04/2009

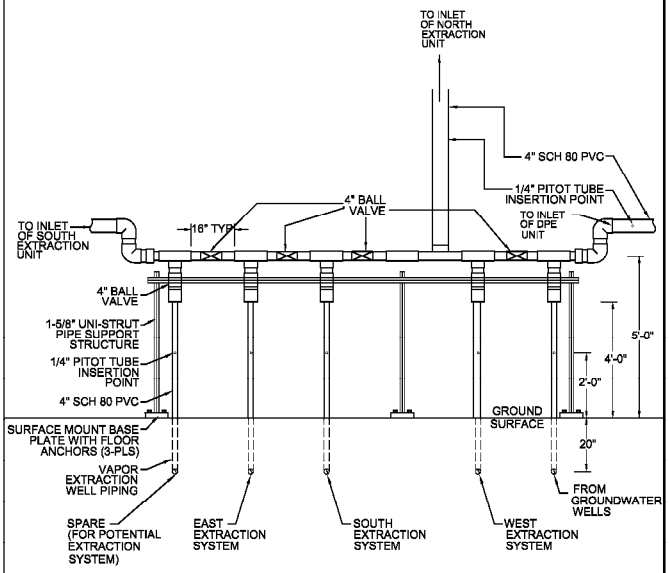
NGSC43935



NOTES:

1. TREATMENT COMPOUND DIMENSIONS - 20' X 35'
2. BOLLARDS TO BE 4-INCH SCH 40 BLACK STEEL PIPE WITH CONCRETE FILL AND CAP. (NOT REQUIRED ON NORTH SIDE DUE TO EXISTING FENCE)
3. 6-FOOT HIGH GALVANIZED (10-FOOT O.C) CHAIN-LINK FENCE WITH PRIVACY SLATS AND TWO 12-FOOT DOUBLE-DRIVE GATE

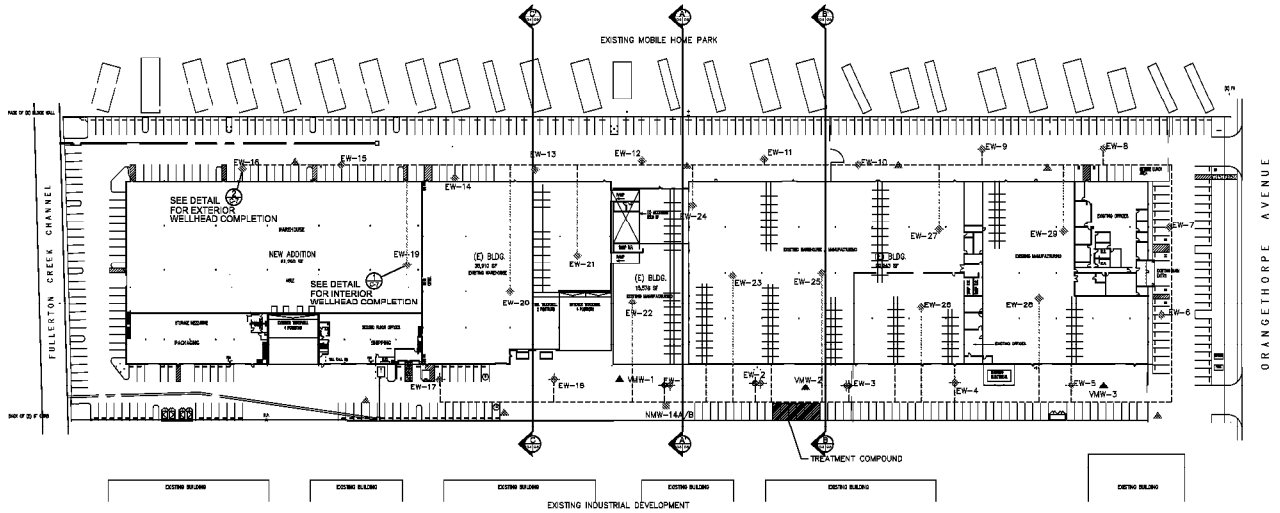
TREATMENT SYSTEM LAYOUT (1 C-2 C-3)
NOT TO SCALE



VAPOR EXTRACTION WELL PIPING MANIFOLD (2 C-2 C-4)
NOT TO SCALE

NO.	DATE	REVISIONS	BY	CHK	DRAWN: A.Q	PROJECT NO: CA100.Y12.DZ	EQUIPOSE CORPORATION 1401 North El Camino Real, Suite 107 San Clemente, CA 92672 Phone: 949.369.0366 Fax: 949.366.0021	TREATMENT SYSTEM LAYOUT	FIGURE: C-3
					ENGINEER: P.S.	SCALE: AS NOTED		FORMER Y-12 FACILITY 301 ORANGETHORPE AVENUE, ANAHEIM, CA	SHEET: 7 of 18
					CHECKED: R.W.B	APPROVED:			REVISION NO: 0
					DATE: 03/08	DATE: 03/08	FILE NAME: C-3 TREATMENT SYSTEM.DWG		DATE: 5/08

NGSC43936



LEGEND

- EXTRACTION WELL CLUSTER - EXISTING
- EXTRACTION WELL CLUSTER - PROPOSED
- EXTRACTION WELL CLUSTER - PROPOSED
- VAPOR MONITORING PROBE CLUSTER - EXISTING
- VAPOR MONITORING PROBE CLUSTER - PROPOSED
- MONITORING WELL CLUSTER - PROPOSED
- INTERIOR PIPING
- EXTERIOR PIPING
- PROPOSED HORIZONTAL WELL - 7 and 15'
- PROPOSED HORIZONTAL WELL - 15'

0 30 APPROXIMATE SCALE

SITE PLAN WITH TRENCH LAYOUT

FORMER YIC FACILITY
3011 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

EQUILON ENTERPRISES LLC
SHELL OIL PRODUCTS US
TESORO REFINING & MARKETING
CONFIDENTIAL

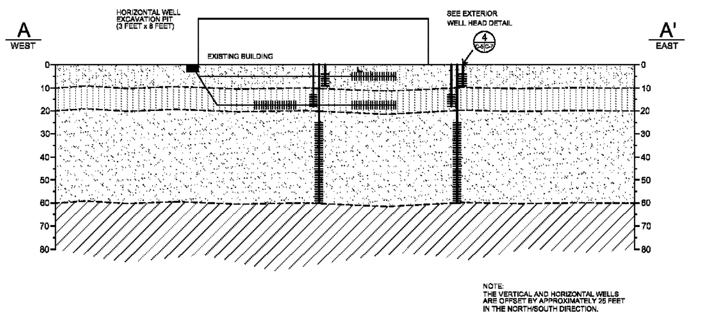
PLATE C-4

SHEET 6 of 18

REVISION NO:

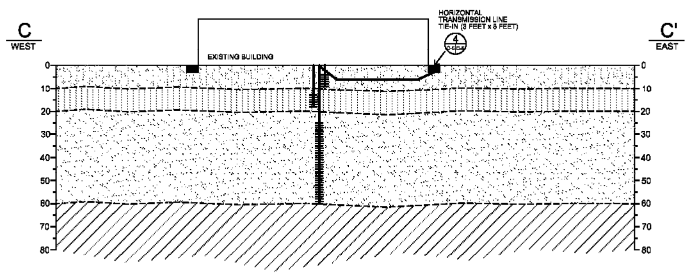
DATE 04/2009

NGSC43937



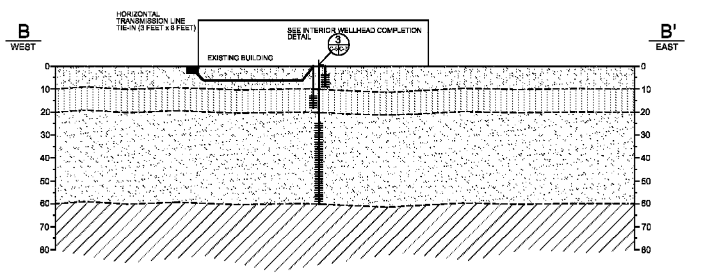
SECTION A-A'

HORIZONTAL AND VERTICAL WELLS



SECTION C-C'

HORIZONTAL PIPING TIE-IN TO VERTICAL WELLS



SECTION B-B'

HORIZONTAL PIPING TIE-IN TO VERTICAL WELLS

LEGEND:

- SILTY SAND (SM)
- SILT (ML)
- SAND (SP)
- CLAY
- VERTICAL WELL AND SCREEN INTERVAL (MULTIPLE WELL COMPLETIONS)
- HORIZONTAL WELL AND SCREEN INTERVAL

INTERIOR PIPING SECTIONS

FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

EQUIPOISE CORPORATION

PLATE: C-5

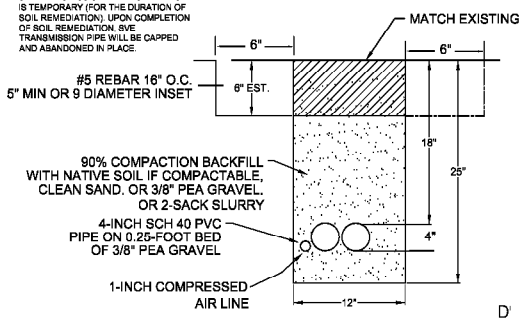
SHEET: 9 of 18

REVISION NO:

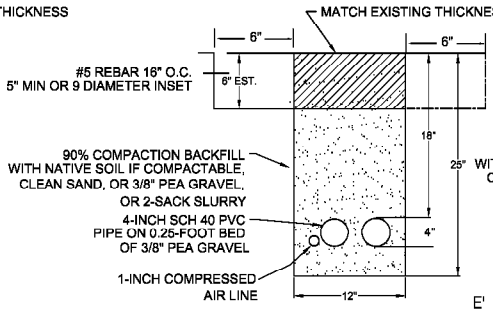
DATE: 04/2008

NGSC43938

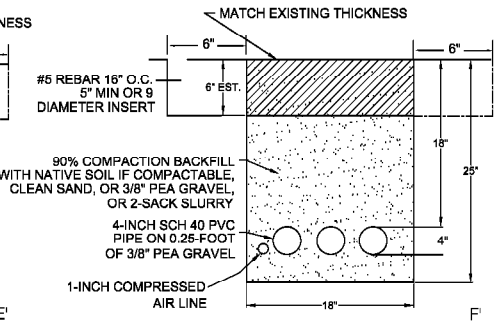
NOTE:
SVE TRANSMISSION PIPE INSTALLATION IS TEMPORARY (FOR THE DURATION OF SOIL REMEDIATION). UPON COMPLETION OF SOIL REMEDIATION, SVE TRANSMISSION PIPE WILL BE CAPPED AND ABANDONED IN PLACE.



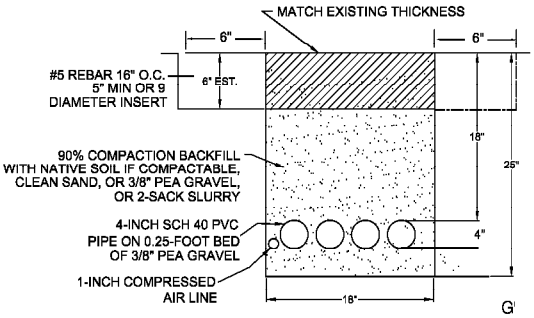
D SECTION FOR SINGLE PIPE TRENCH
NOT TO SCALE



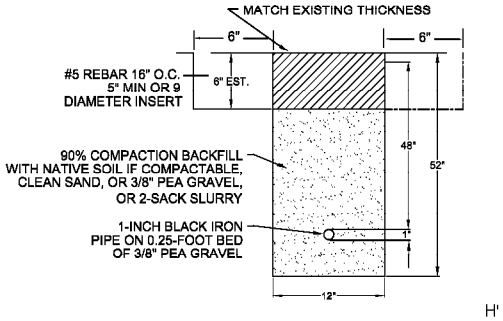
E SECTION FOR DOUBLE PIPE TRENCH
NOT TO SCALE



F SECTION FOR TRIPLE PIPE TRENCH
NOT TO SCALE



G SECTION FOR QUADRUPLE PIPE TRENCH
NOT TO SCALE



H SECTION FOR ELECTRICAL CONDUIT TRENCH
NOT TO SCALE

NOTE: SEE GENERAL NOTES ON T-1 FOR INSTALLATION.

NO.	DATE	REVISIONS	BY	CHK

DRAWN: A.Q | PROJECT NO: CA100.Y12.DZ
ENGINEER: T.E.N. | SCALE: AS NOTED
CHECKED: R.W.B | APPROVED:
DATE: 03/08 | DATE: 03/08
FILE NAME: C-4 TRENCH SECTIONS.DWG

EQUIPOISE CORPORATION
1401 North El Camino Real, Suite 107
San Clemente, CA 92672
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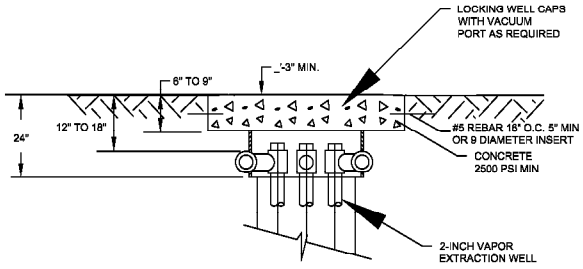
Fax: 949.369.0981

TRENCH SECTIONS
FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE, ANAHEIM, CA

FIGURE: C-6
SHEET: 10 of 18
REVISION NO: 0
DATE: 03/08

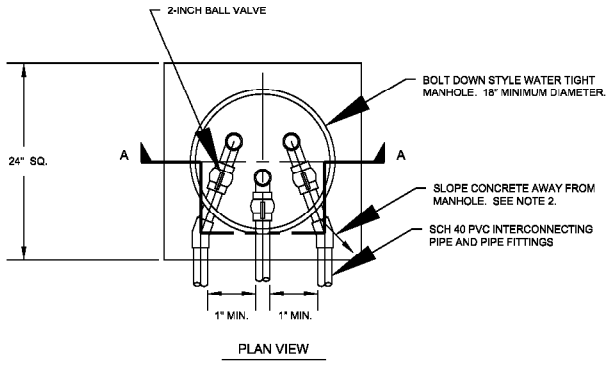
NGSC43939



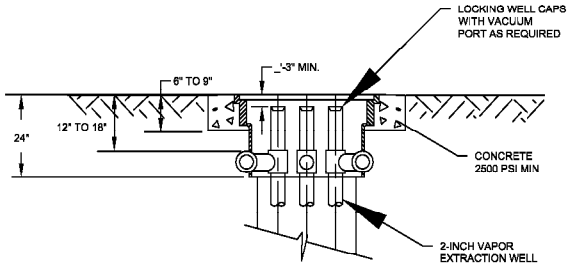
SECTION VIEW A-A

NOTES:
1. CONCRETE OR ASPHALT SAW CUT OVERCUTS ARE NOT ACCEPTABLE.
2. MINIMUM CLEARANCE BETWEEN WELLS TO BE SPECIFIED BY ENGINEER.

INTERIOR WELLHEAD DETAIL (3)



PLAN VIEW



SECTION VIEW A-A

NOTES:
1. CONCRETE OR ASPHALT SAW CUT OVERCUTS ARE NOT ACCEPTABLE.
2. CROWNING REQUIREMENT AT MANHOLE TOP IS 1/2" SLOPE PER FOOT.
3. MINIMUM CLEARANCE BETWEEN WELLS TO BE SPECIFIED BY ENGINEER.
4. INSTALL TRACER WIRE ON ALL HORIZONAL PIPING RUNS.
5. SLOPE HORIZONTAL SVE PIPING BACK TO WELL. 2% MINIMUM SLOPE.

EXTERIOR WELLHEAD DETAIL (4)

NO.	DATE	REVISIONS	BY	CHK

DRAWN: A.Q | PROJECT NO:
ENGINEER: P.S. | SCALE: AS NOTED
CHECKED: R.W.B | APPROVED:
DATE: 03/08 | DATE: 03/08
FILE NAME: WELL HEAD DETAILS C-5.DWG

EQUIPOISE CORPORATION
1401 North El Camino Real, Suite 107
San Clemente, CA 92672
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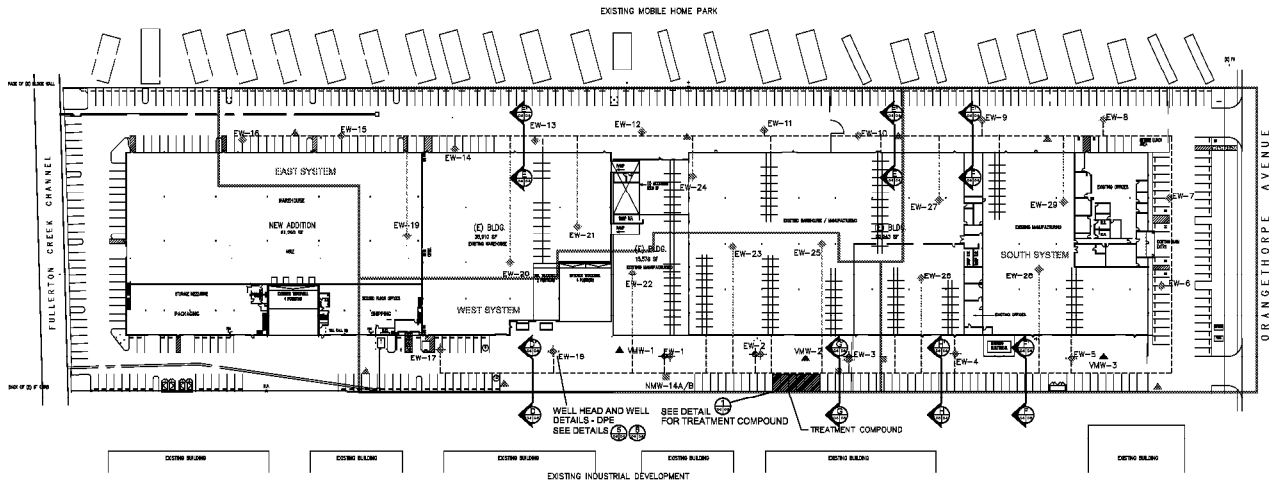
WELL HEAD DETAILS

FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE, ANAHEIM, CA

FIGURE: C-7
SHEET: 11 of 18
REVISION NO: 0
DATE: 05/08

NGSC43940



LEGEND

- EXTRACTION WELL CLUSTER - EXISTING
- EXTRACTION WELL CLUSTER - PROPOSED
- SVE/DPE WELL CLUSTER - PROPOSED
- VAPOR MONITORING PROBE CLUSTER - EXISTING
- VAPOR MONITORING PROBE CLUSTER - PROPOSED
- MONITORING WELL CLUSTER - PROPOSED
- INTERIOR PIPING
- EXTERIOR PIPING
- PROPOSED HORIZONTAL WELL - 7 and 15'
- PROPOSED HORIZONTAL WELL - 15'

0 30 APPROXIMATE SCALE

PIPING PLAN

FORMER YLC FACILITY
3011 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

EQUILON ENTERPRISES LLC
SHELL OIL PRODUCTS US
TESORO REFINING & MARKETING
CONFIDENTIAL

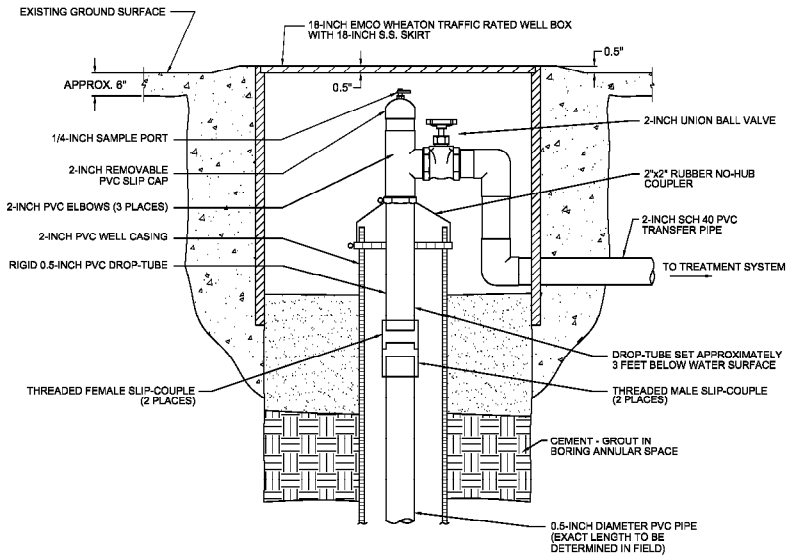
PLATE C-8

SHEET 6 of 18

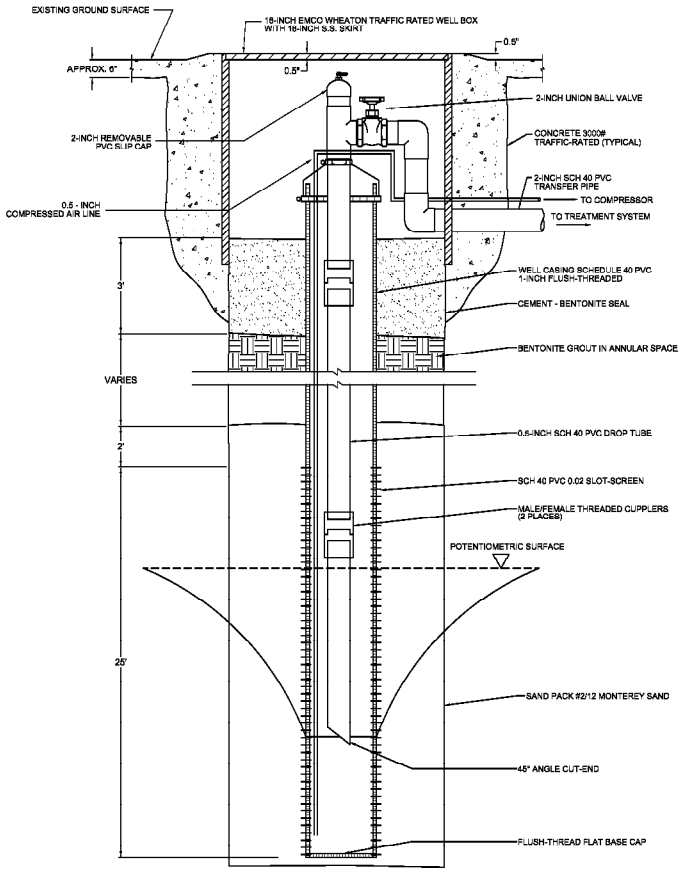
REVISION NO:

DATE 04/2009

NGSC43941



WELL HEAD DETAIL
NOT TO SCALE
6
G-1 | G-4



DUAL PHASE VAPOR EXTRACTION WELL AND WELL BOX LAYOUT
NOT TO SCALE
5
G-1 | G-4

NO.	DATE	REVISIONS	BY	CHK

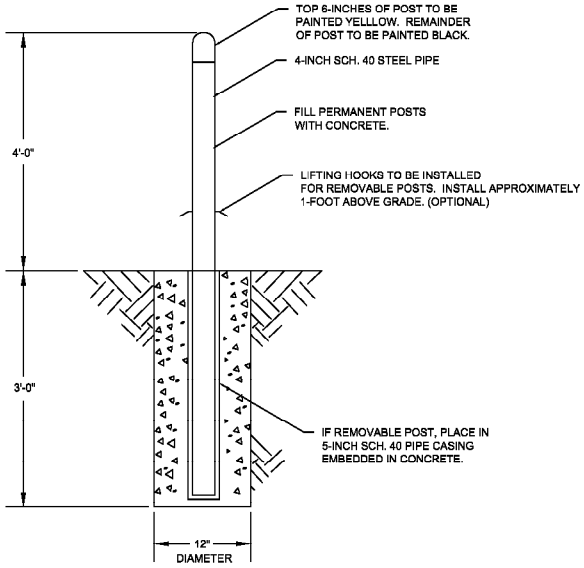
DRAWN: A.Q. | PROJECT NO.:
ENGINEER: P.S. | SCALE: AS NOTED
CHECKED: R.W.B. | APPROVED:
DATE: 5/9/08 | DATE: 05/08
FILE NAME:

EQUIPOISE CORPORATION
1401 North El Camino Real, Suite 107
San Clemente, CA 92672
Phone: 949.369.0966
Fax: 949.369.0981

WELL HEAD AND WELL DETAILS- DPE
FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE, ANAHEIM, CA

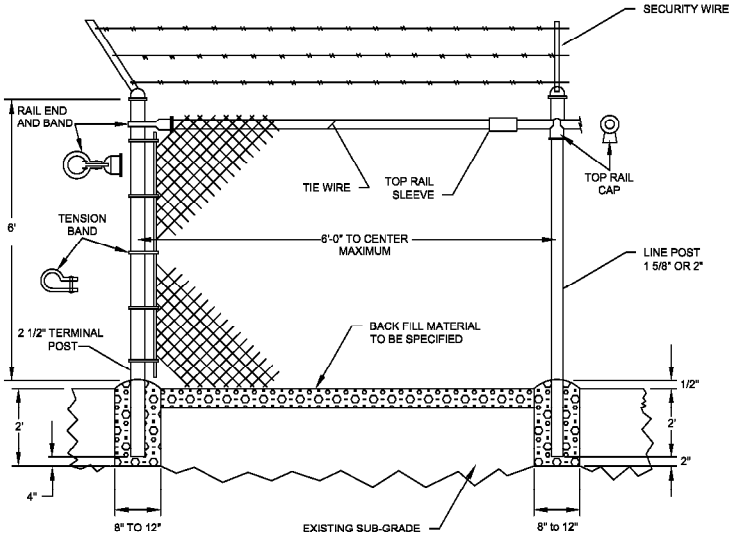
FIGURE: C-9
SHEET: 13 of 18
REVISION NO: 0
DATE: 05/08

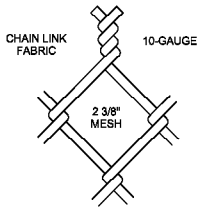
NGSC43942



8 / C-2 BOLLARD DETAILS
NOT TO SCALE

NOTES:
1. CONCRETE OR ASPHALT SAW CUT OVERCUTS ARE NOT ACCEPTABLE.
2. CONCRETE SPEC: 2500 PSI MIN. AT 28 DAYS.





7 / C-2 FENCE DETAILS
NOT TO SCALE

NOTES:
1. POST HOLE DIAMETER IS THREE TIMES THE DIAMETER OF THE POST.
2. USE SUBSURFACE CLEARANCE PROTOCOL FOR FENCE INSTALLATION
3. PRIVACY SLATS TO BE INSTALLED

NO.	DATE	REVISIONS	BY	CHK

DRAWN: A.Q | PROJECT NO:
ENGINEER: P.S. | SCALE: AS NOTED
CHECKED: R.W.B | APPROVED:
DATE: 03/08 | DATE: 03/08
FILE NAME: Fence and Bollard Details C-2

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Phone: 949.369.0966
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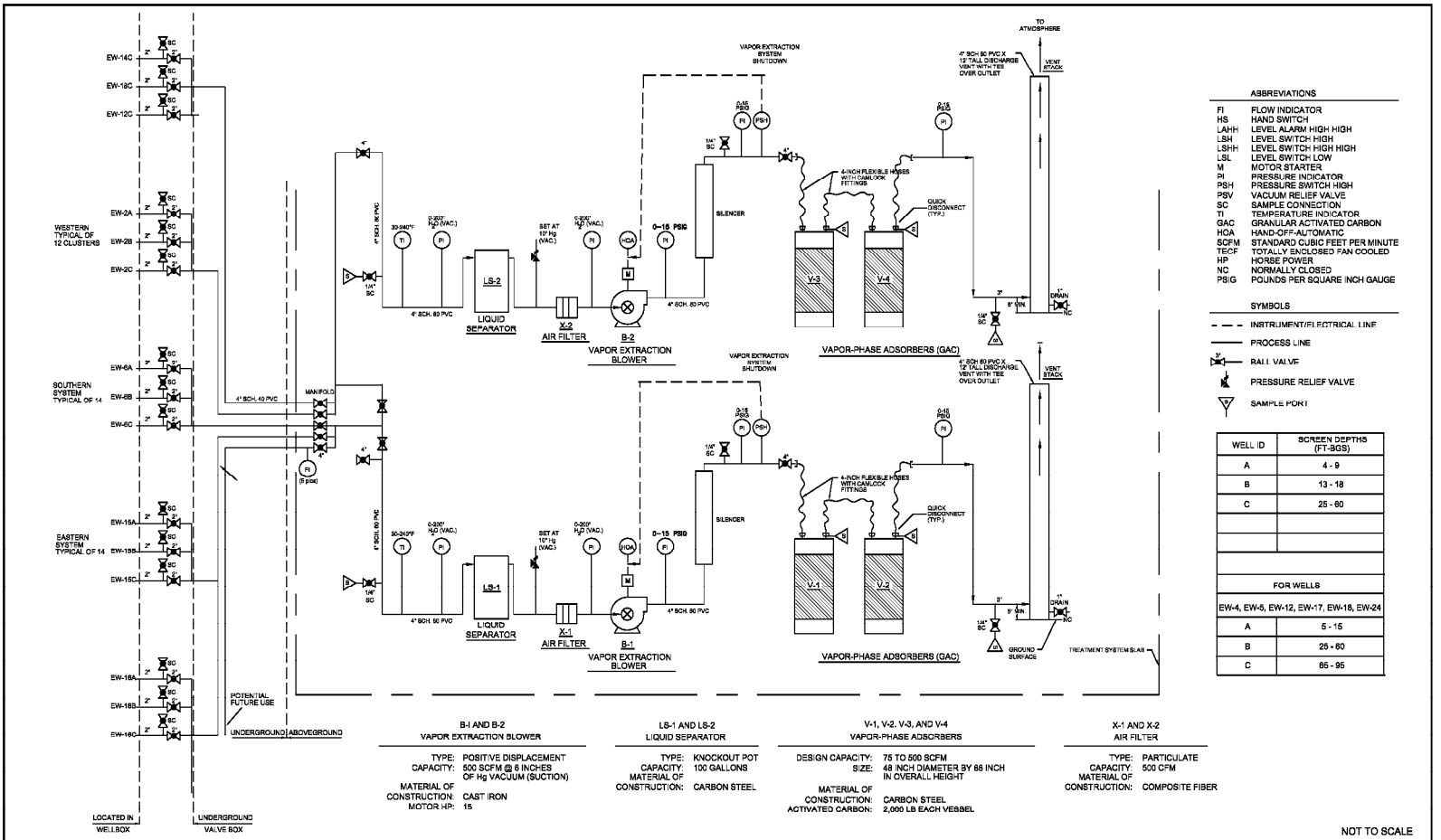
FENCE AND BOLLARD DETAILS
FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE, ANAHEIM, CA

FIGURE: C-10
SHEET: 14 of 18
REVISION NO: 0
DATE: 03/08

NGSC43943



ABBREVIATIONS

FI	FLOW INDICATOR
HS	HAND SWITCH
LAHH	LEVEL ALARM HIGH HIGH
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH HIGH
LSL	LEVEL SWITCH LOW
M	MOTOR STARTER
PI	PRESSURE INDICATOR
PSH	PRESSURE SWITCH HIGH
PSV	VACUUM RELIEF VALVE
SC	SAMPLE CONNECTION
TI	TEMPERATURE INDICATOR
GAC	GRANULAR ACTIVATED CARBON
HOA	HAND-OFF-AUTOMATIC
SCFM	STANDARD CUBIC FEET PER MINUTE
TECF	TOTALLY ENCLOSED FAN COOLED
HP	HORSE POWER
NC	NORMALLY CLOSED
PSIG	POUNDS PER SQUARE INCH GAUGE

SYMBOLS

- INSTRUMENT/ELECTRICAL LINE
- PROCESS LINE
- BALL VALVE
- PRESSURE RELIEF VALVE
- SAMPLE PORT

WELL ID	SCREEN DEPTHS (FT-BGS)
A	4 - 9
B	13 - 18
C	25 - 60
FOR WELLS	
EW-4, EW-5, EW-12, EW-17, EW-18, EW-24	
A	5 - 15
B	25 - 60
C	65 - 95

B-1 AND B-2 VAPOR EXTRACTION BLOWER

TYPE: POSITIVE DISPLACEMENT
CAPACITY: 500 SCFM @ 6 INCHES OF Hg VACUUM (SUCTION)
MATERIAL OF CONSTRUCTION: CAST IRON
MOTOR HP: 15

LS-1 AND LS-2 LIQUID SEPARATOR

TYPE: KNOCKOUT POT
CAPACITY: 100 GALLONS
MATERIAL OF CONSTRUCTION: CARBON STEEL

V-1, V-2, V-3, AND V-4 VAPOR-PHASE ADSORBERS

DESIGN CAPACITY: 75 TO 500 SCFM
SIZE: 48 INCH DIAMETER BY 66 INCH IN OVERALL HEIGHT
MATERIAL OF CONSTRUCTION: CARBON STEEL
ACTIVATED CARBON: 2,000 LB EACH VESSEL

X-1 AND X-2 AIR FILTER

TYPE: PARTICULATE
CAPACITY: 500 CFM
MATERIAL OF CONSTRUCTION: COMPOSITE FIBER

NOT TO SCALE

NO.	DATE	REVISIONS	BY	CHK

DRAWN: A.Q. DATE: 3/08
ENGINEER: P.S.
CHECKED: R.W.B
APPROVED:
DATE: 03/08
PROJECT NO:
SCALE: NTS
FILE NAME: P-1 P-ID.DWG

EQUIPOISE CORPORATION
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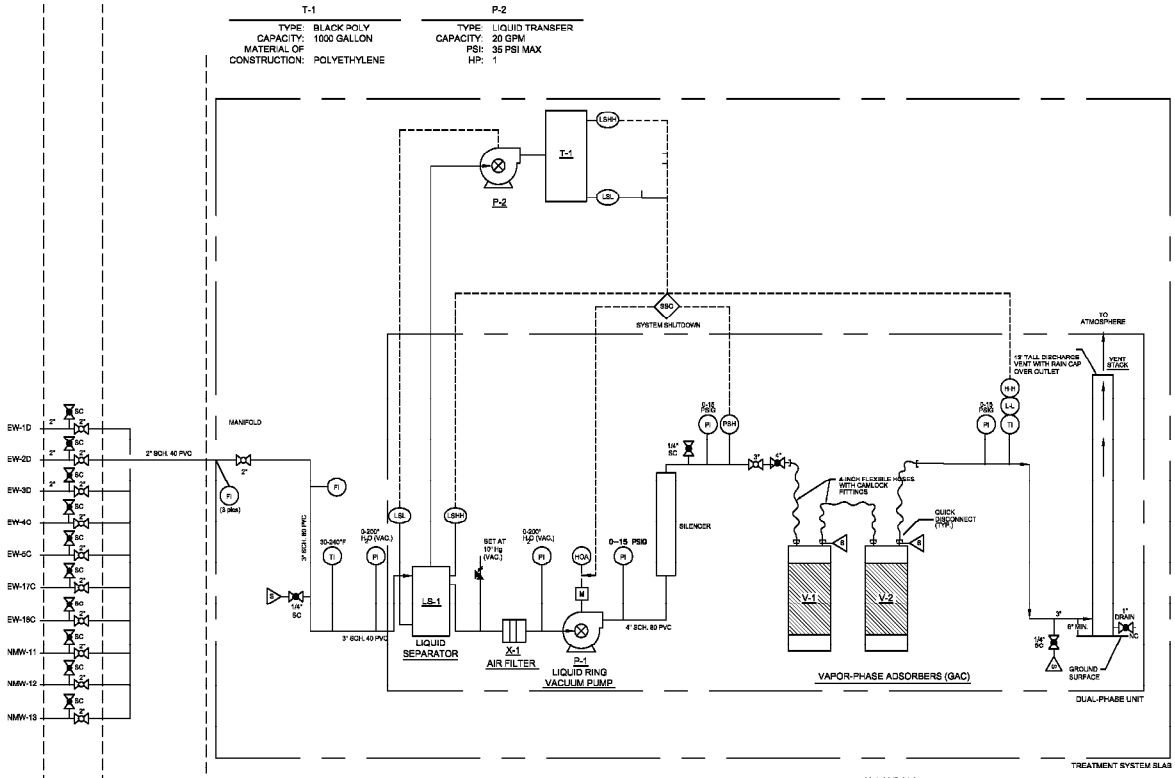
PROCESS AND INSTRUMENTATION DIAGRAM

FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE, ANAHEIM, CA

FIGURE: P-1
SHEET: 15 of 18
REVISION NO: 0
DATE: 3/08

NGSC43944



ABBREVIATIONS

FI	FLOW INDICATOR
HS	HAND SWITCH
LAHH	LEVEL ALARM HIGH HIGH
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH HIGH
LSL	LEVEL SWITCH LOW
M	MOTOR STARTER
L-L	LOW TEMP OFF
H-H	HIGH TEMP OFF
PI	PRESSURE INDICATOR
PSH	PRESSURE SWITCH HIGH
PRV	VACUUM RELIEF VALVE
SC	SAMPLE CONNECTION
TI	TEMPERATURE INDICATOR
GAC	GRANULAR ACTIVATED CARBON
HOA	HAND-OFF-AUTOMATIC
SCFM	STANDARD CUBIC FEET PER MINUTE
TECF	TOTALLY ENCLOSED FAN COOLED
HP	HORSE POWER
NC	NORMALLY CLOSED
PSIG	POUNDS PER SQUARE INCH GAUGE

SYMBOLS

- SSO — SYSTEM SHUTDOWN
- INSTRUMENT/ELECTRICAL LINE
- PROCESS LINE
- BALL VALVE (NORMALLY CLOSED)
- BALL VALVE (NORMALLY OPEN)
- PRESSURE RELIEF VALVE
- SAMPLE PORT

WELL ID	SCREEN DEPTHS (FT-BGS)
EW-1	65 - 95
EW-2	65 - 95
EW-3	65 - 95
EW-1	65 - 95
EW-2	65 - 95
EW-3	65 - 95
EW-1	65 - 95
EW-2	65 - 95
EW-3	65 - 95
EW-1	65 - 95

P-1
LIQUID RING DUAL-PHASE VACUUM PUMP
TYPE: POSITIVE DISPLACEMENT
CAPACITY: 300 SCFM @ 28 INCHES OF Hg VACUUM (SUCTION)
MATERIAL OF CONSTRUCTION:

LS-1
LIQUID SEPARATOR
TYPE: KNOCKOUT POT
CAPACITY: 100 GALLONS
MATERIAL OF CONSTRUCTION: CARBON STEEL

V-1 AND V-2
VAPOR-PHASE ADSORBERS
DESIGN CAPACITY: 75 TO 600 SCFM
SIZE: 48 INCH DIAMETER BY 86 INCH IN OVERALL HEIGHT
MATERIAL OF CONSTRUCTION:

X-1
AIR FILTER
TYPE: PARTICULATE
CAPACITY: 600 CFM
MATERIAL OF CONSTRUCTION: COMPOSITE FIBER

NOT TO SCALE

NO.	DATE	REVISIONS	BY	CHK

DRAWN: A.Q — DATE: 02/05
ENGINEER: P.S.
CHECKED: R.W.B — DATE: 02/05
PROJECT NO:
SCALE: NTS
APPROVED:
FILE NAME: P-ID P-1.DWG

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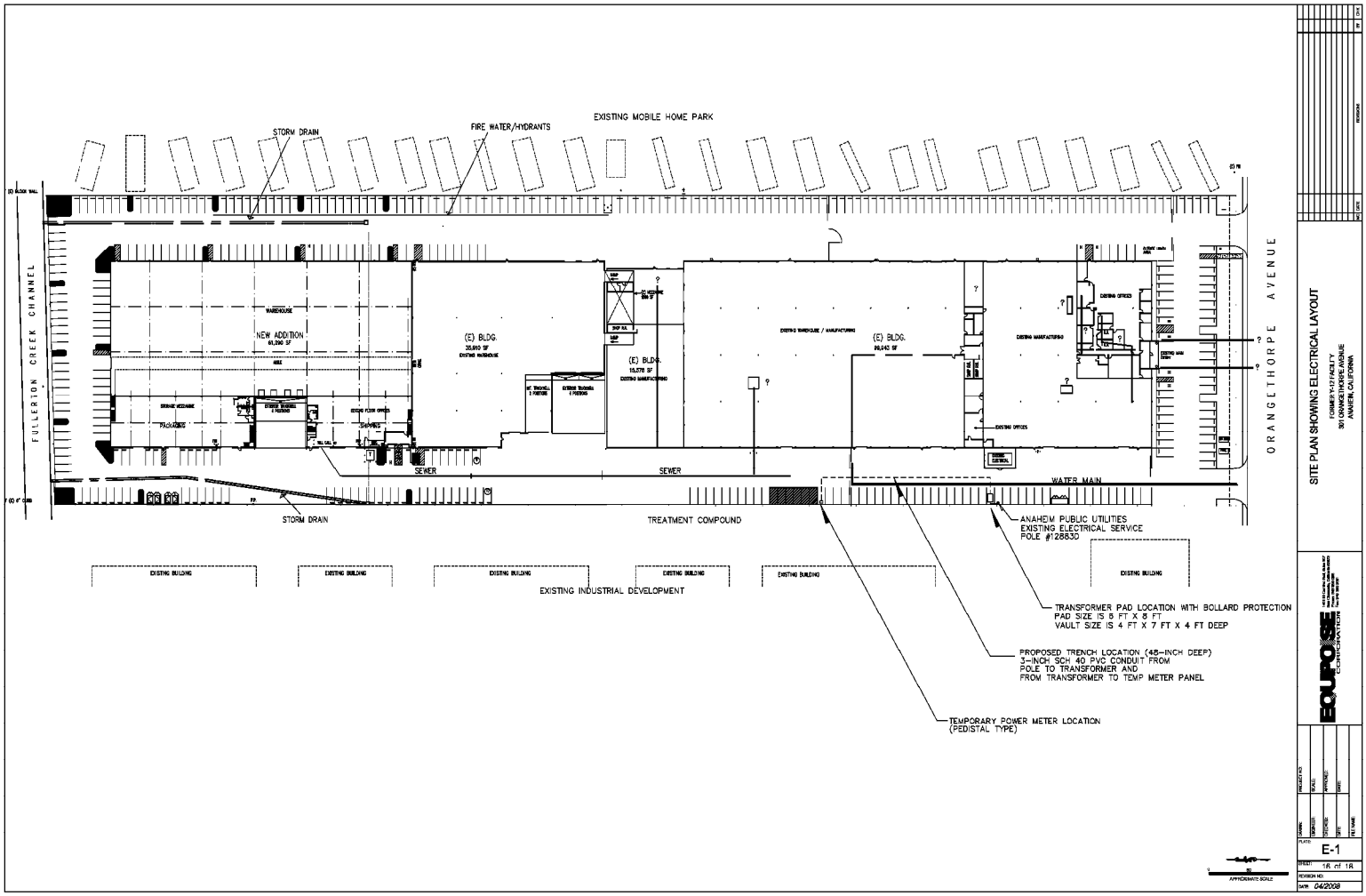
PROCESS AND INSTRUMENTATION DIAGRAM - DPE SYSTEM
Former Y-12 Facility
301 Orangethorpe Avenue, Anaheim, California

FIGURE: P-2
SHEET: 16 of 18
REVISION NO: 0
DATE: 05/08

NGSC43945



SITE PLAN SHOWING ELECTRICAL LAYOUT

FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

EQUIPOISE CONSTRUCTION

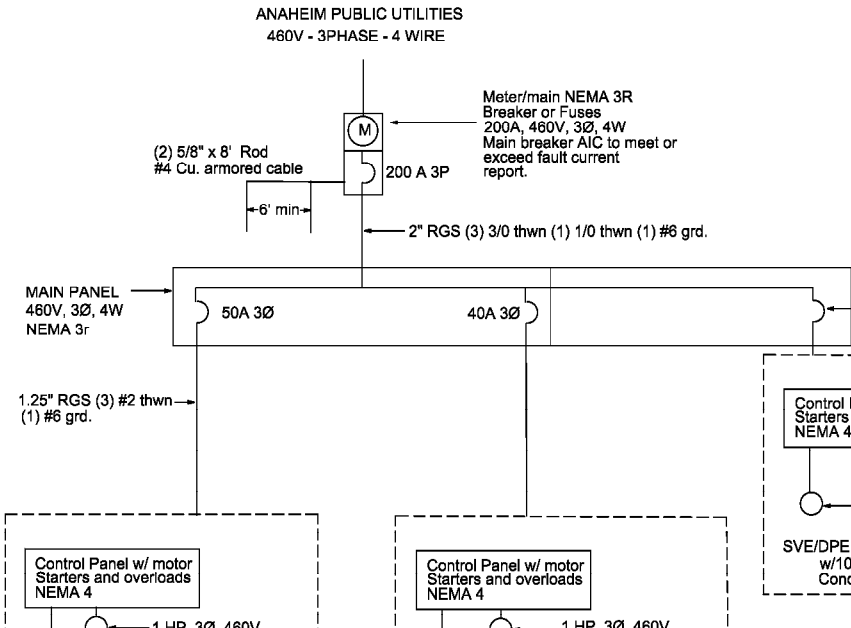
E-1

SHEET 1R of 1R

REVISION NO:

DATE 04/2008

NGSC43946



LOAD SCHEDULE

MAIN PANEL 200A 460V 3Ø	
System 1: Blower Motor	44A
Transfer Pump	2.1A
System 2: Blower Motor	23A
Transfer Pump	2.1A
System 3: Blower Motor	44A
Transfer Pump	2.1A
Control Power	5A
25% LCL	30A
Total Connected Load	152A

Notes:

1. All conductors will be stranded copper type thwn.
2. All conduits from the meter panel to the system will be above grade and outside hazardous area.
3. All conduit from the transformer to the meter panel will be subgrade.
4. All conduit and fittings will be rigid galv steel (RGS raintight).
5. System 1 includes Eastern and Southern operational units.
   System 2 includes Western operational units.
   System 3 includes groundwater remediation unit.

SINGLE LINE DIAGRAM AND LOAD SCHEDULE

FORMER Y-12 FACILITY
301 ORANGETHORPE AVENUE
ANAHEIM, CALIFORNIA

EQUIPOISE CORPORATION

PLATE: E-2
SHEET: 1R of 1R
REVISION NO:
DATE: 04/2008

NGSC43947